Spain's Entry into the European Community: The Effect on Spain's Beef Sector

An Honor's Research Project

Presented in Partial Fulfillment of the Requirements for the Degree Bachelor of Science in the Agricultural Honor's Program of the Ohio State University

by

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1989

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ACKNOWLEDGEMENTS

The author is deeply indebted to several individuals who have made the completion of this honor's research study possible. To her advisor, Dr. Richard L. Meyer, who encouraged her endlessly throughout the research and guided her through a difficult but challenging program, thanks hardly seems adequate. His guidance, constructive criticism and suggestions have been invaluable in the process of conducting this research; the author thus wishes to extend her gratitude to Dr. Meyer for his contribution to her education at OSU.

The author's sincere gratitude is also extended to Dr. Leroy Hushak, who always made himself available to discuss this project and review the methodology. His helpful comments and suggestions enable her to finish this work in its present form.

Thanks also goes to Dr. Dale W. Adams, Dr. Thomas T. Stout, and Dr. Ted E. Darrow for all of their encouragement, and to the members of her committee, Dr. Meyer, Dr. Hushak, and Dr. Richard Clark.

The author also wishes to acknowledge the contribution of Dr. Florentino Portero in Madrid, Spain who obtained for her valuable materials related to this study. Appreciation is also extended to Dr. David Kelch and Dr. Stephen Hiemstra of the USDA-ERS for providing copies of their studies and for making suggestions regarding related literature. Special

thanks to Jose Antonio Munoz for sending slides; his kindness is appreciated. And last but not least, to her parents, to her friends, and to Thomas, the author expresses her love and admiration. The sacrifices made by them on her behalf are many for which she is eternally grateful.

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Chapter I

INTRODUCTION

Spain has recently emerged from dictatorial rule which had lasted for forty years. The Franco dictatorship (1936-1975) had turned the nation into a pariah of the international system and isolation was the inevitable consequence. The desire for international recognition is now combined with the need to strengthen the weak social democratic government of Adolfo Suarez, President of the Socialist-Workers Party in Spain (PSOE). In the context of Spanish foreign policy analysis, the Iberian peninsula has often been referred to as a "foursided house whose windows are open in all directions,"(Ruperez, 1979) but since the early 1950's, Spain has sought to change her foreign policy, placing her European interests first. In the "foursided house," the northern window has been flung open and the Spanish peoples have finally decided to look out of it; the viewers being attracted by the higher standard of living in Western Europe and viewing other Western European nations' progress as a possible role model for Spanish economic development.

In 1986, Spain joined the ranks of the European Economic Community (which will be discussed in detail in chapter III), but whether one looks at GNP figures, economic structure or trade between Spain and the Community of Ten,

one cannot fail to notice the considerable differences that exist between the two sides. Spain is generally referred to a semi-industrialized or 'newly industrialized' (NIC) country in order to distinguish it both from other developing countries--the world 'developing' is often used only as a euphemism--and the group of nations that are already 'developed', or sometimes call 'advanced industrialized countries' which includes all the original members of the EC (West Germany, France, Italy, The Netherlands, Belgium and Luxembourg), and those of the first enlargement (The United Kingdom, Denmark, and Ireland), with the possible exception of Ireland since her status as a 'developed' nation is more a matter of principle than of fact when one compares the standard of living in Ireland with that of the rest of the 'developed' world. The NICs are a very disparate group of countries comprising Spain, Portugal, and Greece (the newest members of the EC) as well as Brazil, Mexico, South Korea, Yugoslavia, Hong Kong, Singapore, and Taiwan (Tsoukalis, 1981). But one characteristic that they all have in common is a very rapid process of industrialization during the last two decades, which has also been translated into a growing share of the world industrial production and world export of manufactured goods. This process of transformation has inevitably brought about a major transformation in all countries concerned.

Spain, by way of EC membership, has now been 'promoted' into the group of advanced industrialized countries, at least in principle, but one look at the harsh realities of the Spanish economy will make one see that the country, despite its remarkable progress since the days of the Civil War, still remains a very poor country and the country faces a long road ahead before it can join the ranks of the advanced industrial nations on an equal footing. Spain still has a peripheral economy (characterized by political and commercial weakness, lack of technological 'know-how', dualism, regional underdevelopment and unequal development, emigration and tourism, antiquated agricultural systems, cultural colonization, foreign debt, high inflation, dependence on imported manufactured goods and defense equipment, etc.) but in recent years, Spain has strived to reach a relatively advanced stage of development with her sights on joining the European community as a full member. There has been extensive urban development, comparable industrial productivity, inflation, foreign investment, a stronger currency and fiscal system, and a degree of cultural autonomy--all characteristics of other Western European nations.

The rapid economic growth of the 1960's, coupled with the profound structural transformation of the 1970's, determined the characteristics of the Spanish economy as it is today. Today, gross value added per employed person in

both industry and services is about equal to that of Italy, Great Britain, and Ireland. In terms of GNP per capita, the difference is greater for two reasons: (1) Spanish agriculture is less productive and employs a greater proportion of the overall workforce; and (2) the activity rate is lower, partly because the population is younger and the unemployment rate is very high (Tamames, 1985, p.41). In Spain, therefore, per capita income is lower in comparative terms than output per worker, and non-agricultural productivity is better than most people believe. The problems then stem from agriculture.

Economic indicators show real growth in gross national product from 1970-1979, negative growth from 1980-81, and inflation over the entire period. Gross domestic product was largest in services (4.3 trillion pesetas),[1] commerce (3.0 trillion pesetas), and transportation/communication industries (1.2 trillion pesetas) in 1983 (Tawil et. al., 1983). By contrast, the contribution of agriculture to Spain's GDP was only 1.0 trillion pesetas, which was less than 7 percent of the GDP that year. (Ministerio de Agricultura, 1984a).[2] The net value of agricultural production per worker rose from 63,900 pesetas to 632,400

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[1] See Appendix A for the table of exchange rates.

[2] According to Tamames, in 1984, commerce and tourism accounted for 58 % of Spain's GNP; manufacturing contributed 28 % ; construction contributed 7 % ; and agriculture, forestry and fishing's share was also 7 %.

pesetas per worker from 1970-84, but this is still low when compared to the net value of agricultural production per worker in the rest of Western Europe (Tio, 1986).

Since the days of the Civil War, Spain has been plagued with one of the highest inflation rates in Western Europe; the average rate of inflation, which was 4.6 percent from the period 1962-1970, rose to over 10 percent from 1970-73, and sky-rocketed to 23.2 percent in 1985. During this same time period, the unemployment rate increased from 4.8 to 18.6; it reached 20.6 in 1984, and in mid-1985 it was estimated that some 21.9 percent of the working population of Spain was unemployed (OECD). This is the highest unemployment rate in Western Europe and shows the seriousness of the economic crisis in Spain and the ineffectiveness of the government to remedy the situation. Furthermore, the standard purchasing power (SPP), or GDP/inhabitant, which was 7,616 in 1983 compared to France's 11,776, Italy's 9,102 or Denmark's 12,053, has seen only moderate increases in the past two decades (Tsoukalis, 1981, p. 62).

Spain has experienced rather steady population growth which has affected the growth of the economy in a variety of ways. In order to maintain the current standard of living in a nation, the rate of economic growth should be equal to or greater than the rate at which the population is growing. Since this has not occurred during certain periods (e.g.

1936-1950), the standard of living has dropped far below that of other Western European nations with this decline in the standard of living most severely felt in the rural areas (Harrison, 1985, p. 15). Spain's population rose from 34.0 to 39.2 million from 1970-1986 while the agricultural population fell from 27.2 to 17.9 percent of the total (Tawil et. al.). [3]

Still, with some 1,947,000 persons employed in agriculture and 27,305,000 hectares devoted to agriculture, Spain's agricultural sector is larger than most other European countries (second only to France in terms of utilized agricultural area; first with 31,570,000 hectares devoted to agriculture) and while Portuguese agriculture employs a greater percentage of the population (23 percent compared to 18 percent in Spain), Spanish farmers far outnumber their Western European counterparts (Tsoukalis, p.224). (see Table 1.1) This means that while it now contributes less to gross domestic product than in years past (5.9 percent in 1983 compared to 9.2 percent in 1980), farming is still an essential component of the Spanish economy (Commission of the European Community, 1985b).

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[3] This is probably a conservative estimate as some sources report that approximately 50 percent of the population was engaged in at least part-time farming in 1975 and that 20 percent of the population still relies on agriculture as their main source of income (Battles, Tsoukalis, Harrison).

Table 1.1[4]

Agricultural Population of Spain, 1970-82 1/

Year	Agriculture	Nonagricultural	Total	Percentage in agriculture
	Thousands			Percent
1970 2/	8475	25140	33615	25.2
1971	8128	25831	33959	23.9
1972	7821	26467	34288	22.8
1973	7566	27043	34609	21.9
1974	7375	27557	34932	21.1
1975	7261	28002	35263	20.6
1976	7150	28460	35610	20.1
1977	6893	29255	36148	19.1
1978	6679	29826	36505	18.3
1979	6470	30386	36856	17.6
1980	6185	31014	37199	16.6
1981	5968	31567	37535	15.9
1982	5757	32103	37860	15.2
1983	NA	NA	NA	NA
1984	NA	NA	NA	NA
	full part-time[3]/			
1985	2145 4794		38129	18.2
1986	2128 4896		39245	17.9
1987	1947 4075		39450	17.8

1/ Data extrapolated by Food and Agricultural Organization of the United Nations based on the Spanish census.

2/ Excludes transients.

3/ Data taken from Eurostat, 1987b

Sources: Tawil et. al. and Eurostat.

Despite the size of the agrarian sector, agriculture has never been able to satisfy the demands of the Spanish population. Thus, Spain has always been a net importer of

[4] The data from this table comes from different sources, thus there is a discrepancy in the percentages between 1982 and 1987.

agricultural commodities, which has worsened the country's balance of payments deficit (5.25 billion U.S dollars in 1987) and foreign debt. In 1983, Spain had a balance of external trade in agricultural and food products of -1.325 (million ECU) and food imports are on the rise (Ministerio de Agricultura, 1986a). Although an important exporter of agricultural products, Spain has had a food deficit every year since 1965 with the sole exception of 1970. As we see from Table 1.2, Spain's main agricultural imports in 1983 were oilseeds and nuts, corn, coffee, animal feeds, beef and veal, fish, and cotton.

Table 1.2
Main Imports of Food and Agricultural Products

Product	million ECU	% of Total ag imports
oil seeds and nuts	870	17.5
unmilled maize	721	14.5
coffee	402	8.1
raw tobaccos	332	6.7
animal feedstuffs	208	5.8
timber simply worked	199	4.0
crustaceans;mollusks	196	3.9
beef and veal	194	3.8
fish;fresh or frozen	176	3.5
cotton	167	3.4
leathers and skins	121	2.4
natural rubber	101	2.0
alcoholic beverages	100	2.0

Source: United Nations Comtrade and Eurostat, 1985a.

In terms of U.S. dollars, the imports of U.S. agricultural products for Spain for the period 1983-1985 differ slightly from those of Table 1.2. As seen in Table 1.3, Spain's main agricultural imports from the U.S. were cereals and cereal preparations, feed grains, oilseeds, oil, nuts, and oil kernels, but soybeans have moved into fourth place above tobacco and timber. Cereals are ranked as the number one commodity imported by Spain.

Table 1.3
Main Imports of Food and Agricultural Products
Millions of U.S. Dollars

Product	1983	1984	1985
Cereals and cereal preparations	908.2	613.9	553.6
Feed grains	875.7	553.3	502.2
Oilseeds, oil, nuts and kernels	795.0	743.6	478.2
Soybeans	762.0	714.9	448.5
Tobacco	299.3	324.4	301.0
Natural Fibers	220.3	213.2	242.4
Animal Feed	169.4	189.5	206.1
Live Animals, Meat Meat Preparations	116.0	144.1	186.3
Raw Cotton	129.1	118.0	143.2

Source: U.S.D.A., Western Europe Situation & Outlook Report, various issues.

The European Community has historically been only a marginal supplier of the Spanish import market, but Spain's trading partners have had to change with EC membership. While Spain only imported 12.6 percent of its agricultural imports from the EC in 1978 and 19.3 percent in 1983, the country now imports about 52.8 percent of its agricultural products from EC member nations (Commission of the European Economic Community, 1985, p. 54). This is a fact that has upset many of Spain's former trading partners, including the U.S., and has been a sensitive issue since Spain requested to join the EC in the early 1970's.

On the export side (Table 1.4), Spanish exports are primarily Mediterranean in character (e.g. fresh fruits and nuts, fresh vegetables, alcoholic beverages, vegetable oils, and processed vegetables). The Community provided the main

export outlet for Spanish agricultural products having imported more than 55 percent of Spain's food and agricultural exports in 1983, valued at 3.649 million ECUs. That same year, Spanish agricultural imports were valued at 4.974 million ECUs, but only 19.3 percent of that total came from the EC. Thus, Spain had a sizeable surplus in its agricultural trade with the Community prior to accession, but this surplus has been overcompensated by Spain's trade deficit with the rest of the world (Commission of the European Community, 1986b, p. 56).

Table 1.4

Main Agricultural and Food Exports of Spain (1983)

Product	million ECU	% of Total ag exports
Fruit, fresh/dried	930	25.5
Vegetables, fresh	407	11.2
Alcoholic beverages	372	10.2
Vegetable oils	341	9.3
Vegetables, prepared or canned	325	8.9
Animal feedingstuffs	232	6.4
Fruits, prepared or canned	136	3.7
Crustaceans;mollusks	134	3.7
Fish, fresh, chilled or frozen	80	2.2
Fish, mollusks, and crustaceans; canned	79	2.2
Various food products	54	1.5
Spices	46	1.3
Unmilled wheat	41	1.1
Sugar-based preara'n	36	1.0
Meats, fresh;chilled or frozen	35	1.0
Wool and hair	30	0.8
Timber simply worked	26	0.7
Fish, dried, salted in brine	21	0.6
Wheat flour and meal	19	0.5

Source: U.N. Comtrade

All things considered, unemployment is Spain's worst problem and the agricultural sector, in addition to high rates of unemployment, has been hard hit by a crisis of traditional agriculture, underemployment, and migratory pressures on a seasonal basis. Much is expected of Spain's agrarian sector in terms of improving Spain's balance of trade with other EC member nations and absorbing labor at a time of serious and increasing unemployment.

It is difficult for one to make generalizations about the agrarian sector in Spain because of its heterogeneity. The "dual structure" of Italian agriculture is often referred to, but Spain's agrarian sector (as will be examined in the next chapter) is even more complex than the classic "latifundia-minifundia" division. Thus it is more appropriate to analyze regional or sectoral effects of Spain's entry into the Community rather than refer to the macro-economic implications for the entire economy or the agricultural sector as a whole.

Spain specializes in and has a definite comparative advantage in the production of so-called Mediterranean products (e.g. citrus fruit, vegetables, table olives and olive oil, table grapes and wine), a fact which has demanded much attention within the EC because of French and Italian farmers' fears of increased competition. Consequently, many studies have been conducted to try and determine the possible impact that the integration of Spain's, Greece's

and Portugal's (all new EC members) horticultural sectors will have on other exporters of Mediterranean products. Studies have also been done on the effect that EC enlargement will have on the Community's Common Agricultural Policy (CAP), its Mediterranean Policy, and its trade with non-member nations (Garcia; Schmidt; Lauga) But there has been little emphasis placed on how EC membership may affect other agricultural sub-sectors such as the cereal grain and livestock sector of Spain, the one sector that may be adversely affected by EC membership. This sector is likely to have some difficulties adjusting to Community policies and competing in the enlarged market because of the generally low level of development in the livestock industry and the country's reliance on grain imports.

In four independent studies, researchers concluded that entry into the EC would raise internal feed grain prices, possibly slowing growth in livestock production and feed grain use in the future (Agra-Europe, 1980; USDA-FAS,1979; Briz, 1979; Peterson, 1983). These studies support the idea that not everyone in Spain will benefit from accession into the EC. For this reason, the author has chosen to examine the Spanish livestock industry prior to and since accession into the EC and to analyze to what extent the supply of domestic livestock products will change (using the beef and veal sector for the empirical analysis) as a result of Spain's entry into the Community and the country's

compliance with Community market, trade, and price policies.

OBJECTIVES

This study assesses the nature of the likely changes in the Spanish livestock sector following its 1986 accession to the European Community (EC) and analyzes the changes in the domestic supply of beef that may result from price changes that can be expected with the harmonization of Spanish and EC pricing polices. The specific objectives are:

(1) To examine the process of EC enlargement to include Spain as a full member nation.

(2) To assess the situation of Spain's agricultural sector prior to accession.

(3) To assess the situation of the Spanish livestock industry and assess the nature of the likely changes that will occur with EC membership.

(4) To analyze product and input price changes that are likely to occur during the 7-year transitionary period during which Spain must adopt the CAP.

(5) To determine the impact of these price changes on the domestic supply of beef in Spain.

The hypothesis of this study is that increases in the price of feedgrains resulting from Spain's adoption of the Common Agricultural Policy (CAP) will lead to decreases in the supply of beef because production costs will rise faster than the market prices that farmers receive for cattle. This may lead to deficits in beef, increased imports from other EC member states to offset the decline in domestic production, and a deterioration of the Spanish beef industry and the Spanish livestock sector as a whole. Or, in an attempt to cut feed costs, sensible farmers may reduce their use of feedgrains in favor of forage in order to still make a profit. But even so deficits are still projected for beef (Peterson; Briz) and, in all likelihood, many beef producers may be forced out of business in the face of higher input prices, lower support prices for their product (Spain, prior to EC membership, maintained high internal support prices for beef), and increased competition from northern beef cattle and dairy producers.

ORGANIZATION OF THE STUDY

The remainder of this study is presented in five chapters and two appendices. The next chapter is a brief description of agriculture in Spain with a particular focus on the country's livestock industry. In Chapter III some basic aspects concerning Spain's entry into the EC are described and there is a discussion of the CAP and the

pending policy changes that may occur in the EC and in Spain. Chapter IV is entitled "Model Specification, Methodology, and Procedures" and deals with the theoretical foundations of the supply model used. In addition it looks at the various variables used in the analysis in an effort to justify them and lays down the expected relationships between the various explanatory variables and the independent variable. Chapter V presents and discusses the results of the analysis, and the final chapter (VI) deals with the conclusions drawn from the analysis and the implications of the results. Appendix A gives the exhange rates and Spain's Consumer Price Index for the period 1970-1987 and lists the terms used throughout the study. Appendix B presents a detailed explanation of the variables and tabulates the secondary data used in the analysis.

Chapter II

DESCRIPTION OF SPANISH AGRICULTURE

Physical Geography, Climate and Agriculture

Physical geography has always played an important role in the economy and the history of the Spanish nation and has, in conjunction with the climatic conditions and governmental policies, shaped the country's agrarian sector.

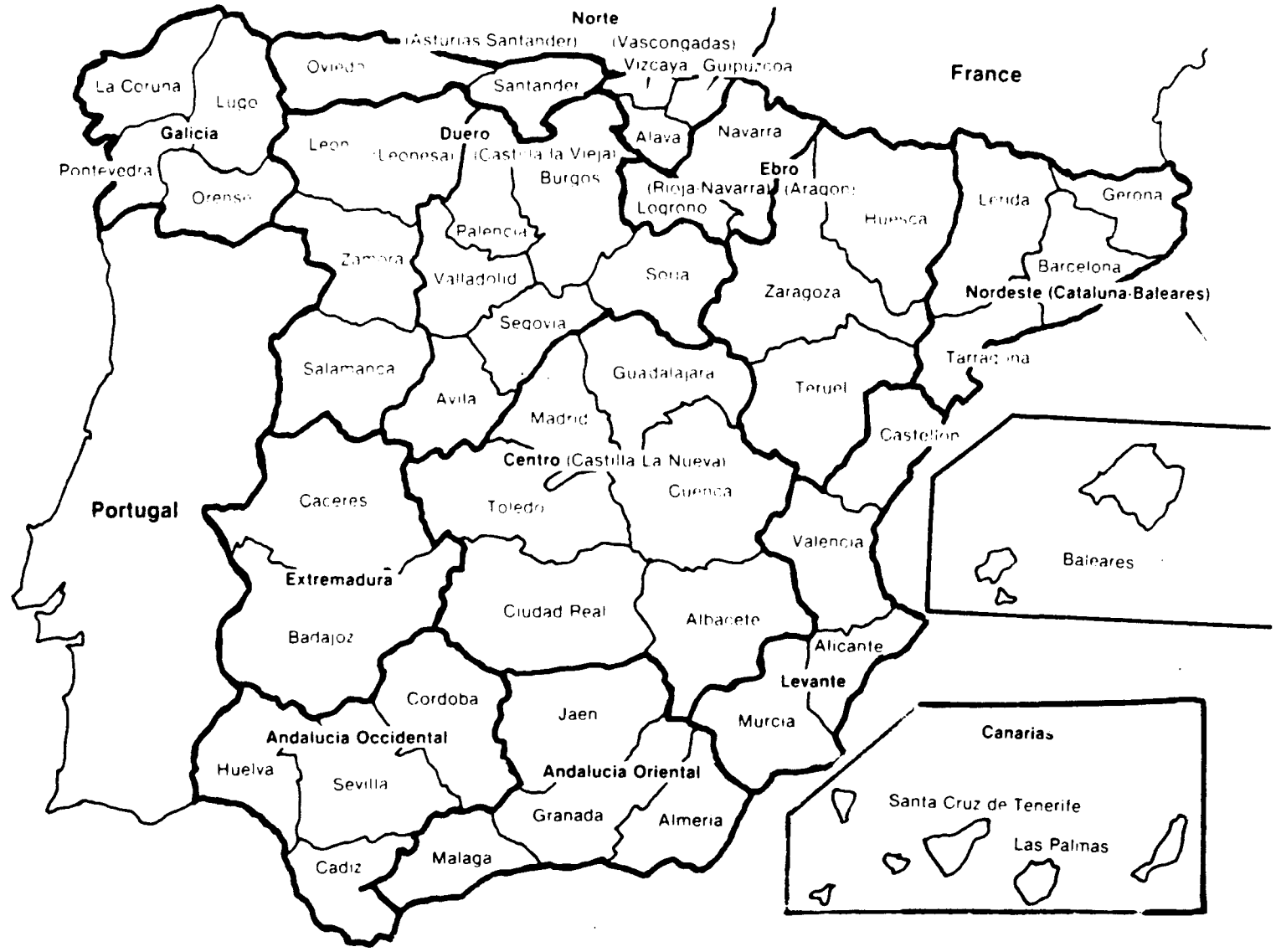
Occupying the greater part of the Iberian Peninsula, Spain is the third-largest country in Europe with an area of 504,750 sq. km. including the Balearic and Canary Islands (194,884 sq. mi.) It is also a very mountainous country; ranking second in Europe next to Switzerland in average altitude; 20 percent of Spanish territory is 1,000 meters or more above sea level; 40 percent is between 500 and 1000 meters; and only 40 percent is under 500 meters (the majority of which can be found on the eastern coast).

The 'meseta' of central Spain covers an area 210,000 sq.km. (81,015 sq.mi.) which is approximately half of the total area of Spain. The Cantabrian mountain chain, which runs along the northern coast of the country from Galicia to the French border where it meets the Pyrenees, the Sierra Nevada in the South, and the Iberian system in the East all lie on the periphery of the central 'meseta' and separate it from the coastal regions. In this seemingly endless chain of mountains, three tertiary depressions can be

distinguished: the Ebro Basin, the Guadalquivir Valley, and the Mesozoic Basin. These areas are irrigated so that much of the cereal cultivation and rough grazing of livestock is concentrated in these three regions. Fruit and vegetable production is also prevalent in the Ebro Valley and in the Tagus (Tajo) River Valley (Teran, pp. 47-48; Tamames, p. 33).

Figure 2.1

Map of Spain



Spain's rugged physical complexity has greatly influenced historical and recent developments; the mutual isolation of the regions were formidable problems until modern means of transportation were finally introduced, and still today marketing and transportation of goods from one region to another by an antiquated railroad system can be difficult. Owing to its mountainous terrain, Spain lacks infrastructure and the roads that do exist radiate from Madrid to the heavily populated coastal cities, which makes the capital and the coastline the center of activity and cuts off the rural areas of the interior (Harrison, p.42). Climate is the atmospheric conditions that characterize a region: solar radiation, temperature, precipitation (rain and snowfall), relative humidity, air pressure and wind. Essentially, Spain has three very different climates--Atlantic, Continental and Mediterranean--making diversified agricultural production possible. However, two seriously inhibiting factors to agricultural production in Spain must not be overlooked; Spain's soil is generally of poor to mediocre quality and the country as a whole suffers from extremes in temperature, which is why the various agricultural regions of Spain tend to specialize in the production of specific products which are suited to the region's natural physical and climatic conditions (Tamames, p.34).

The Atlantic climate of the northern provinces (from

the French border to the northwest Cantabric coast), Galicia, and the northern half of Portugal (Entre Duoro e Minho) represent what is often referred to as "Wet Iberia" where there is extensive rainfall and a milder range in temperatures throughout the year. This area presents many common points with the dairy belt of Western Europe (when one looks only at climatic conditions and not at structural differences). It is a region of intensive farming on small farms devoted to livestock and dairy production, and although the climatic and topographical conditions of the region are more favorable to agricultural production than those in the rest of the country, the region as a whole is poor and suffers from antiquated production structures, inadequate marketing systems, and there is a definite need for land consolidation. The focus of the next section will be on the weaknesses of this region and structural diversity and deficiencies in the livestock sector in Spain.

To the south of the Cantabrian mountains the landscape and climate changes completely; therefore, the region's agriculture is markedly different too. The climate of the Castilian 'meseta' is continental with long periods of drought. Except in a few mountainous areas where rainfall is abundant, rainfall is unpredictable and rarely exceeds 700 mm. In some areas of southeastern Andalucia, rainfall barely reaches 300 mm, which is why the area is called "Dry Iberia" (Commission of the European Community, 1986b,p.5).

Two characteristics clearly mark Spanish agriculture when one considers land distribution by crop. First of all, more than 60 percent of all arable land (41 percent of all land) is left fallow, and secondly, a large area of land is covered by tree and bush crops, particularly olive trees and grapevines. Cereals, particularly wheat, olive oil and wine are the three key products produced in the dry farming areas of central Spain. There is also some livestock production based on free grazing in the arid southwestern region, and intensive poultry and swine operations involving confinement and use of feed concentrates are located in southern Castile-La Mancha (Tamames). Most of Spain's large farms (latifundias), with all of their associated problems, are found in this region and throughout all of Andalucia.

On the Mediterranean and Atlantic coasts and in the plains of Andalucia the climate becomes Mediterranean, which is why it was previously mentioned that it would be an error to consider the whole of Spain as 'Mediterranean' for this is clearly not the case. Still, so-called 'Mediterranean' crops enjoy precedence: fruit and vegetables, vines (predominant in Penedes, Catalonia, Jerez, Malaga, Montilla in Andalucia), olives, and almonds. Spanish vineyards, which form the largest total in the world in size, export some 5 to 6 million hectoliters a year despite lower average yields than in other wine-producing countries of Western Europe, and the olive plantations, which cover more than two million

hectares, yield exportable quantities of oil varying between some tens of thousands and more than 100,000 tons a year. Spain is also the world's leading exporter of oranges, tangerines, and mandarins, and the world's leading producer and exporter of almonds. Other important export crops, which are generally produced in the irrigated Mediterranean regions that yield excellent returns at low cost include: grapefruits, melons, watermelons, strawberries, peaches, apricots, apples, tomatoes, cucumbers, peppers, marrows and courgettes, aubergines, artichokes, French beans, lettuces and endives, and onions. (European Community Commission, 1982).

Clearly, given the relative importance of Mediterranean agriculture to the Spanish economy, it is understandable why such emphasis is placed on the production of these important export crops products and on irrigation of dry areas, yet Spain has not yet been able to maximize usage of any of the existing irrigation systems. Spain has approximately 3 million hectares of irrigated farmlands which represent 14.4 percent of cultivated lands, but irrigation is still probably inadequate, despite its extent, in relation to the immense size of the dry areas. Studies completed by the Ministry of Agriculture in Madrid conclude that there are 1,750,000 hectares of unclaimed irrigable lands: 1,350,000 hectares could be irrigated by surface waters; and 400,000 hectares could be supplied by underground waterways, thus

giving Spain a maximum irrigation area of 4.75 million hectares. Investment in irrigation systems is, without a doubt, one of the most profitable forms of investment in Spain given the high returns, but most Spanish farmers have neither the capital nor the equipment to improve their antiquated irrigation systems or to irrigate where irrigation does not currently exist (Ministerio de Agricultura, 1983d).

Farm Structure

By far the most severe structural problem plaguing Spanish agriculture is that of it land tenure system. Spain is heavily parcelled and the number of farms is great, but the size of the farms is generally quite small except in the regions where latifundias exist. Latifundism abounds in Andalucia, Extremadura, La Mancha and Salamanca. It is characterized by low yields, absenteeism, a disproportionate distribution of income and capital flight to major cities like Madrid and Malaga. Land owners are usually unwilling to set up the irrigation systems and undertake intensive crop farming that is necessary to increase yields. The sociological and political consequences of latifundism are still strongly felt. In the regions of Spain were latifundias still exist, there are vast numbers of seasonal workers who go long periods unemployed which is one of the main reasons why the country's unemployment rate has been

historically so high (Carrion, 1972). These "poverty pockets" are areas of serious cultural backwardness, where intense social and political grievances are felt. Until most recently, the most ardent desire of most landless farm laborers in these areas was that the large estates should be shared out, divided amongst the farmhands who worked the land by way of agrarian reform measures that had failed throughout history. However, this attitude towards agrarian reform is now undergoing profound changes. Farm laborers who cling to their work in the field now want higher wages, better housing, social security and schooling for their children (Tamames). Many of them no longer see their salvation in the mere redistribution of land, for they now realize that, in an era of mechanization and improved agricultural technology, small family farming units do not offer desirable standards of living. Although they may not always clearly say so, farmhands are looking for new jobs in enterprising companies to raise their living standards, which could become a problem in the not to distant future given the equally high rate of unemployment in industry.

In pronounced contrast to the enormous unproductive estates of Andalucia and Extremadura, with their absentee landlords and huge reserves of landless peasant laborers, are the 'minifundias' of the Northwest, particularly in the province of Galicia. 'Minifundias' are small, economically-unsound parcels of land that can barely support the most

rudimentary type of subsistence farming and livestock production. The land is often leased rather than bought outright; a land ownership system lending itself to even further parcelling (Ministerio de Agricultura, 1983c) (See Table 2.1).

Table 2.1 Size and Number of Farms in Spain

Thousands of Parcels

Size of Parcel	1962	1972	1982
less than 0.5 hectares	34,879	18,392	
0.5-0.99		4,152	20,496
1.0-4.99	3,460	3,682	
5 or more hectares	653	830	
total number of holdings	44,649	45,634	20,496
Average Surface Area/Parcel	1.14	1.68	2.16

Source: Agrarian Censuses, 1962, 1972, 1982; taken from Tamames, p. 49.

Many farms comprise small operations on scattered plots; this poor design has been somewhat mitigated by farmers in the north who, apart from working their own land, cultivate other parcels of land under a tenancy or share-cropping system. The use of modern machinery is nearly impossible because individual farmers cannot afford the cost associated with mechanization, nor do they have an incentive to invest money in lands which they do not own. Land distribution among owners and the relative importance of

tenancy farming systems are reflected in Table 2.2.

Table 2.2 Distribution of Farms by Size, 1982

Kind and Size	No. of Farms 1982		Surface Area 1982	
	x1000	%	10^3	%
landless	31	1.3	-	-
with land	2,344	98.6	44,312	100.0
small	2,220	92.9	13,183	28.5
0.0-0.9	595	24.9	265	0.5
1.0-4.9	881	36.9	2,127	4.7
5.0-49.9	744	31.1	10,791	24.0
medium	93	3.7	8,489	18.9
50-99.9	62	2.5	4,234	9.4
100-199.0	31	1.2	4,255	9.5
large	31	1.1	26,650	50.9
200-499.9	19	0.7	5,887	13.2
500-999.9	7	0.2	4,777	10.7
1000 +	5	0.2	11,974	27.0

Source: Tawil, et. al.

Irrigation and fertilization use are not practical on such small plots of land; and pest control and combating soil erosion are exceedingly difficult, if not impossible due to the extreme divisioning of the land. Moreover, the loss of fertile farmland to boundaries grows as parcel size decreases, so land consolidation acts have been aimed at remedying the problems of excessive parcelling. The objective of land consolidation operations (overseen by the

Instituto de Reforma y Desarrollo Agrarios--the Agrarian Development and Reform Institute) has been to give each farmer one consolidated holding or a much smaller number of parcels equal in size, kind of terrain and crop variety to what he formerly owned, and to provide new parcels that have access to roads (Kelch).

Unfortunately, land consolidation efforts have been only somewhat successful for the consolidation of fifteen 0.2 hectares parcels into two 1.5 hectare parcels is hardly an improvement; the average farm size in Galicia and Asturias is still only 2.5 hectares despite consolidation efforts (Tawil, et.al.). The Northern provinces are still in desperate need of a more comprehensive program aimed at creating larger individually or collectively run farms which would make it possible to obtain substantial advantages of economies of scale.

Other structural problems that seem to plague the 'minifundias' include: multiple crop and livestock production, dependence on farm family labor, elderly farmers, and a high illiteracy rate among these farmers. All of these factors contribute to low agricultural incomes in the regions in which this type of farming predominates.

In recent years, many small farmers have faced bankruptcy, and more often than not, all members of peasants households have had to look for off-farm work in order to supplement their family farm incomes in the face of sky-

rocketing inflation. Many displaced farm workers migrate to France and Italy at harvest time in search of seasonal employment. Migration of farm workers was facilitated when Spain joined the European Community, but even the seasonal migration has proved to be little more than an escape valve for Spain's thousands of peasant farmers who have not been able to make ends meet with their meager farm incomes (Tio). Table 2.3 shows the evolution of the general index of prices received by farmers since 1964. In the same table one can also see the index for prices paid by farmers for input purchases and prices received for their products. The ratio for prices paid and received, given in the last column, is the parity index, which measures price improvements (>100) or deteriorations (<100).

INDEX OF PRICES RECEIVED AND PAID BY FARMERS

	Prices received	*Prices paid*	*Parity prices*
1964 (*base year*)	100.0	100.0	100.0
1965	116.5	103.3	112.7
1966	120.8	106.4	113.5
1967	117.2	108.9	107.6
1968	124.8	110.0	113.4
1969	131.1	111.7	117.3
1970	128.5	114.6	112.1
1971	136.5	119.9	113.8
1972	151.0	121.6	124.1
1973	169.7	135.1	111.1
1974	184.5	175.9	104.8
1975	215.5	190.0	113.4
1976	237.8	207.8	114.3
1976 (*base year*)	100.0	100.0	100.0
1977	126.3	114.0	108.4
1978	142.8	128.5	110.8
1979	152.1	146.6	106.8
1980	156.8	173.6	89.6
1981	176.8	206.1	85.8
1982	204.9	228.1	90.2
1983	223.8	264.0	84.8
1984	245.4	318.2	77.1

Source: Ministry of Agriculture. Taken from Tamames, p. 47.

The Livestock Industry

This section gives a general description of the entire livestock sector, but since the main objective of this study is to assess the likely changes that will occur within the beef and veal industry of the livestock sector, greater emphasis is placed on the production of beef and veal so that the reader may have a better understanding of the particular problems that plague this sector. The rest of the material is included in order to give the reader a general overview of the Spanish livestock sector as a whole.

The livestock sector in Spain has grown rapidly since the early 1960's. The impressive growth in Spain's overall agricultural output over the past twenty years is attributable to extensive innovation. Starting from a very low-level of development, livestock production (which has increased at a faster rate than crops) has been increasing at an annual rate of 4 percent since 1965, yet the country is not self-sufficient in the production of all livestock products and thus has had to import much of its meat from the United States, Europe, Australia, and Argentina (Peterson). However, now because of EC policy, Spain's trading partners have changed as will be discussed in detail in the next chapter.

Table 2.4 **Livestock inventories by type, Spain 1970-1987**

Years	Cattle	Hogs	Sheep
	Thousands of Head		
1970	4282.5	7620.5	17005.4
1971	4169.1	7423.1	16667.7
1972	4234.7	8048.1	15150.6
1973	4495.6	9111.7	16238.4
1974	4437.8	8670.9	15598.6
1975	4335.6	8662.3	15195.8
1976	4384.4	9248.3	14776.4
1977	4538.0	9804.0	14536.0
1978	4601.0	10496.0	14522.0
1979	4469.0	10531.0	13800.0
1980	4495.0	11263.0	14180.0
1981	4450.0	10850.0	14768.0
1982	4874.0	12023.0	16456.0
1983	4954.0	12426.0	16690.0
1984	5012.0	12695.0	16578.0
1985	5260.0	14570.0	16320.0
1986	5280.0	14932.0	15954.0
1987 (est.)	5391.0	16200.0	15122.0

Sources: Ministerio de Agricultura, Anuario de Estadistica Agraria,1974-86; Anuario Estadistico de la Produccion Ganadera, 1970-84.

Beef and Dairy Cattle

The cattle sector is the most heterogeneous of all the livestock sectors in Spain in terms of breeds, farms size, and production methods. Generally, beef, veal, and milk production are joint activities because of the extensive use of dual-purpose cattle breeds and the reliance on dairy calves and cull dairy cows as sources of meat. Approximately half of all of Spain's cattle are Friesians and at least a quarter are Brown Swiss-Charolais, both dual-purpose breeds

that are extensively cross-bred with foreign and domestic strains (Peterson, et. al.).

Nearly 45 percent of Spain's cattle herd is located in the northwestern provinces of Galicia, Asturias, and Santander. Again, this is the region where minifundism prevails, yet this region alone produced 47 percent of all cow milk and 26 percent of all domestic beef and veal in 1985. These provinces also export calves to other regions of Spain for fattening and slaughter. The Duero and Ebro Valleys are cattle-fattening regions (though there are no feedlot operations even remotely comparable to those of the midwestern United States) and the Basque Provinces import significant numbers of cattle for slaughter as they are important consumption areas (Tawil, et. al).

Despite a twenty year trend of increased consumption of beef and veal in Spain, consumption remains relatively low in comparison to the rest of Europe and to other industrialized nations. Per capita beef and veal consumption in Spain increased from 7.7 Kg per year in 1965 to 12.7 Kg in 1980; in the U.S. consumption was 62 Kg for that same year. In France and Italy the corresponding consumption figures were 29 Kg and 22 Kg, respectively (Tawil, et. al; Peterson, et. al).

Although beef and veal consumption remains relatively low in Spain, domestic production has never been able to keep up with the steadily increasing demand, which has built

up as a result of the rise in the standard of living since the late 1960's. (See Table 2.5 for summary of growth in cattle numbers and their use). Therefore, in order to meet domestic needs, Spain has relied heavily on beef imports. Because of the poor soil and climatic conditions, the country has also been unable to meet domestic demand for any of the cereals (except rice) and has had to import most of the grains commonly fed to livestock--a fact which has severely limited growth of the cattle industry (European Community Commission, 1982; Tsoukalis). But perhaps just as important as Spain's dependence on imported feedgrains, structural inadequacies and antiquated production systems have historically kept the cattle sector underdeveloped.

Table 2.5 **Cattle in Spain by age and use, 1970-84**

Item	1970	1971	1972	1973	1974
			Thousands		
Less than 1 yr	995.2	937.1	973.6	1075.7	1106.2
1 to 2 years	790.7	761.5	783.9	844.4	826.4
More than 2 yrs					
Dairy	1827.0	1860.9	1870.6	1935.0	1852.4
Breeding	27.2	24.6	25.6	26.8	30.4
Slaughter	642.4	585.0	581.0	613.7	622.4
Total	2496.6	2470.5	2477.2	2575.5	2505.2

	1975	1976	1977	1978	1979
			Thousands		
Less than 1 yr	1985.0	1124.5	1139.0	1146.0	1165.0
1 to 2 years	878.0	803.9	803.9	810.0	804.0
More than 2 yrs					
Dairy	1811.0	1821.8	1821.8	1950.0	1810.0
Breeding	33.0	32.2	33.0	36.0	36.0
Slaughter	618.6	602.2	614.0	659.0	654.0
Total	2462.6	2456.2	2597.0	2645.0	2500.0

	1980	1981	1982	1983	1984
			Thousands		
Less than 1 yr:	1169.0	1132.0	1218.0	1221.0	1232.0
1 to 2 years	776.0	754.0	776.0	773.0	778.0
More than 2 yrs					
Dairy	1852.0	1853.0	2032.0	2122.0	2186.0
Breeding	35.0	35.0	42.0	42.0	43.0
Slaughter:	663.0	675.0	806.0	815.0	818.0
Total	2550.0	2563.0	2880.0	2979.0	3047.0

Sources: Ministerio de Agricultura, Anuario de Estadistica Agraria, 1974-86; Anuario Estadistico de la Produccion Ganadera,1970-84; Anuario Estadistico de la Produccion Agricola,1965-1979.

Unlike in the U. S., most of Spain's cattle are raised on either traditional extensive production systems (i.e. large ranches where the cattle graze freely on open pasture) or on semi-intensive, mixed production systems where the cattle are managed with periods of confinement and periods of free grazing. As mentioned above, there are very few feedlot operations in Spain where cattle are "finished" for market by feeding them feedgrains, thus Spanish beef cattle usually have a longer production cycle than those of the U. S. or Australia. There are two reasons why this is probably so; first, it has been a tradition for cattle to be raised on either family farms for the production of both meat and milk or on large latifundias based on free grazing; and secondly, there are tremendous costs associated with owning a feedlot operation, especially since over half of the country's feedgrains have to be imported. In addition to this, dual-purpose cattle have lower rates of gain than breeds used solely for beef production (e.g. Hereford, Shorthorn, Charolais, Angus, Chianina) and growth hormones are not used extensively in Spanish cattle production; thus, it stands to reason that it would take longer for them to reach market weight [5] (Tio; Peterson; Ministerio de Agricultura, 1983c; Lopez de Sebastian).

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[5] Approximately 42 percent of beef produced in Spain comes from fattened yearling (anojos), 24 percent comes from veal calves, and the rest comes from cows and bulls (Peterson; Tawil).

It is difficult to generalize about beef cattle enterprises with respect to their use of feedgrains because Spanish beef producers, unlike swine or poultry producers, have a greater choice of feeding alternatives available to them. However, based on Peterson's study, the author assumes that many beef producers in the cereal-producing regions of Spain, who operate semi-intensive operations, feed forage which is produced on the farm and feeds which are purchased and mixed on the farm. It is also assumed that producers allow their cattle to graze freely until 120-150 days before slaughter when they are kept in permanent confinement and fed mixed feeds (1983, p. 52). (It should be noted that production structures and feed rations vary greatly from region to region--on the extensive systems of the southwest where there is little rainfall and limited irrigation systems, beef producers have to buy both feed-mixes and forages; and on the family-owned minfundias of Galicia and Asturias, there is limited pasture land on which the cattle may graze so grass silage and alfalfa must be fed.) The feedgrains which are fed may vary from region to region, but 'typical' Spanish cattle rations would include barley, which is grown domestically in Spain and for which the country is nearly self-sufficient; corn, two-thirds of which is imported; wheat bran, which is also grown domestically as a winter crop; soybean meal, the majority of which is imported; and alfalfa (Peterson et. al., p. 62).

Before entry into the EC, most of the corn and soybean imports that were fed to cattle came from the U. S. and Argentina and were purchased at prevailing world market prices. With accession, however, imported corn will more likely come from France and will be considerably more expensive for Spanish producers to purchase because of the high internal EC prices for feedgrains (The EC's price support system will be discussed in detail in the next chapter). Soybeans will likely continue to be imported from the U. S. and Argentina, but their price will also increase because of EC price policy and barriers to trade (Tio; The World Food Institute; Schmidt). Thus, one can assume that cattle producers will either reduce their production in response to the higher cost of feedgrains, or reduce their use of corn and soybeans in livestock rations in favor of some cheaper sources of protein and carbohydrates. It is reasonable to assume that farmers may start feeding more wheat bran in place of the soybean meal (very little wheat is currently fed to livestock) [6] and increase barley usage in place of corn. However, since the EC's support price for barley is currently higher than Spain's, (Eurostat, 1986b) the price that farmers will pay for barley is also likely to increase in the EC scenario. Therefore, one might predict that farmers would favor the use of corn over barley, depending on which of the two grains has a higher internal

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[6] Peterson, et. al., p. 12.

price.[7]

One of the few livestock products in which Spain has reached a level of self-sufficiency is milk. The country has more than tripled its annual milk production since 1965 while domestic consumption has remained fairly constant. In 1984 Spain produced 6 billion liters of milk from 1,880,000 cows; thus each cow averaged 3,200 liters/year, and although this figure still lags behind the 'dairy belt' of Northern Europe, domestic demand for fluid milk was easily met by domestic production and no milk (with the exception of powdered and sweetened condensed milk) was imported that year (Agra-Europe, 1980; Orbaneja).

Milk production is concentrated in the Northwest of Spain where the climate is more temperate. This region is where most of the fluid milk produced in Spain is also consumed (much of the milk produced is for home consumption), and what is not consumed is shipped elsewhere for the sole purpose of making butter or cheese. Current consumption levels for milk and other dairy products are higher than in other Mediterranean countries, but still considerably lower than in the rest of Europe (Tio; Orbaneja).

On the whole, Spain, unlike the United States and many Northern European countries, is not a country where great

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[7] Time will be the determining factor as to which of the two, corn or barley, becomes more expensive to feed because EC support prices for cereals are set annually.

quantities of dairy products are consumed. When speaking with some Spanish friends, the author found that most believe that milk is for calves, babies, making cheese, and mixing with coffee--not for adult consumption, thus they naturally thought it odd that she was accustomed to drinking milk with all meals, not just breakfast. (Wine, water, or sangria are the preferred beverages commonly served with lunch and dinner).

Before Spain's accession to the EC, a wide range of programs that affected beef and milk production were instituted by FORPPA[8] and the World Bank (through the Agencia de Desarrollo Ganadero--the Agency for Cattle Development) in hopes of attaining self-sufficiency in beef, veal , and milk production. Programs included improvement of pasture, feeding of agro-industrial by-products, financial aid to cattle producers wishing to import superior breeds, widespread availability of artificial insemination, development of forage feeds, and increased use of feed concentrates. In the 1960's and early 1970's, the Spanish government's policies were aimed at stimulation beef production, using premiums and price incentives to encourage farmers to feed cattle to higher slaughter weights. However, this cash premium program for increased slaughter

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[8] The Spanish acronym for "The Foundation for the Arrangement and Regulation of Agricultural Production and Prices," which is a division of the Ministry of Agriculture and responsible for the regulation of external trade and internal market policies.

weights that had been in effect since 1964 was terminated in 1977 after substantial increased slaughter weights had been achieved and the program became to costly to continue (Kelch; Lopez de Sebastian). Despite all of these programs aimed at improving productivity, Spain remains dependent on foreign imports of beef and veal and its dependence may increase if consumption patterns continue to follow current upward trends, which, in all likelihood, they will.

Swine

Most of the hogs in Spain are foreign breeds and crosses that are bred and raised in intensive production systems in the Central Meseta. Extensive pig farming does still exist, however, on traditional extensive farms in the South--hogs raised in this area are usually indigenous breeds which are generally fatter 'bacon-type' breeds.

Intensive, commercial hog farms produce about 85 percent of all pork; according to USDA statistics, 50 percent of Spain's hogs are raised under some form of contractual arrangement between producers and feed manufacturers (Tawil, et. al.; Peterson, et. al.). Most of the country's commercial hog farmers specialize in either breeding or fattening, thus generating considerable movement of hogs, which are often farrowed in one province, fattened in another, and slaughtered in yet another (Tio; Peterson, et. al.).

While hogs are raised primarily in the Central provinces and in the South, fattening operations are generally located in the Nordeste-Cataluna and Levante regions near the greatest concentration of feed manufacturers. These two regions alone account for the production of nearly all the hogs slaughtered in Spain each year (Peterson et. al).

Unlike cattle production, hog production has expanded greatly over the past decade in conjunction with a fairly rapid transition from very traditional production methods to modern methods and improved facilities. This growth in production has been made possible by the introduction of smaller breeds that gain weight rapidly and improved feeding practices and management techniques.

Pork has always been an important part of the Spanish diet and per capita consumption has been rising steadily over the past twenty years. In 1984, per capita consumption of pork rose to 27 kg, surpassing poultry meat consumption (24 kg per person in 1984), thus making pork the most widely consumed meat in the country.

Spain has traditionally been a net importer of small amounts of pork, but has recently reached a level of self-sufficiency and imports have declined steadily as a result. Still, the existence of African Swine Fever in Spain precludes the export of pork to most of Europe and unless the disease can be eradicated, Spain may not be able to

remain self-sufficient in pork production and becoming an exporter of pork will not be a future possibility (Peterson, et. al.; Briz).

Poultry

The poultry sector has experienced an extraordinarily rapid transformation in the past two decades. According to the Yearbook of Agricultural Statistics, over 10 million barnyard chickens were slaughtered in 1960 for a total production of only 13,000 metric tons of meat. By 1978, however, Spain's poultry meat sector was producing some 755,000 metric tons, of which 92 percent of the slaughtered birds were broilers that were raised in modern, intensive, confinement systems of production. In 1986, Spain produced 870,000 metric tons of poultry meat, of which 96 percent was produced on modern, commercial farms (United Nations, FAO, 1986).

Egg production has also expanded quite rapidly as the poultry sector evolved from a traditional to a modern system relying on selected laying hens. Most of the country's broiler and layer breeds are not domestic breeds, but rather are breeds originating in North America. Although Spain still imports small amounts of poultry meat to meet its ever increasing demand, the country has gone beyond self-sufficiency in the production of eggs and may begin exporting the surpluses of its egg production in the future.

Poultry products are produced on highly specialized

commercial farms which are frequently linked to feed manufacturing firms. In 1982, there were 3 breeding farms, 282 farms producing eggs for hatching, 119 hatcheries, and an unknown number of broiler and egg-producing farms. The majority of these farms have no agricultural land base and purchase almost all of their production inputs (Peterson, et. al.). Commercial poultry farms are usually located near large cities which are also centers for compound feed manufacturers. Many important feed companies control large flocks of broilers and layers through direct ownership or contractual arrangements, and a relatively small number of large commercial poultry farms account for most of the poultry meat and egg production (Briz; Peterson et. al.).

Per capita consumption of poultry meat has risen steadily since the early 1960's. One source estimates that consumption in 1960 was 0.4 kg per year; per capita consumption was 24 kg in 1984 (Briz). Per capita egg consumption has fluctuated greatly over the years, reaching 17.0 kg per year in 1970, falling to 15.4 kg in 1978, and returning to 17.0 kg per year in 1984. Among the OECD member countries, only West Germany and the United States have consistently registered higher levels of egg consumption (European Community Commission, 1986; Agra-Europe, 1985).

Under the Franco dictatorship, there was very little Government intervention in the poultry industry, but in 1975

the government became more involved in regulating the industry. The government established a target and intervention price for poultry meat producers and a maximum wholesale price that was instituted to protect consumers (Kelch; Lopez de Sebastian). Prior to accession into the European Community, the Spanish government used a reference price, computed as a weighted-average wholesale price from selected markets all across the country, in order to follow the market. If the reference price fell below the intervention price, FORPPA had to finance the storage of eggs and chickens and often had to pay export restitutions to the producers. However, if the reference price were to rise about the consumer protection price, then the eggs and chickens would be released from storage or the government could import poultry products. With entry into the EC, the market mechanism for regulating poultry meat and egg prices will change very little as the market greatly resembles that of the rest of the Community (Kelch). However, as we shall see in the next chapter, prices will change during the transitionary period in order to harmonize Spanish prices with those of the EC.

Sheep and Goats

Spain has had a long tradition of raising sheep and goats for meat, milk, and wool. However, over the years the sector has been experiencing a steady decline and it is no longer as important to the economy as it was in the past.

One of the main reasons for the decline in the sheep and goat sector is that there is a shortage of men willing to work as shepherds (Carrion; Briz). The life of a shepherd is difficult and the pay leaves something to be desired. In addition to the scarcity of good shepherds, falling prices for wool, mutton, and goatmeat, and increased competition from other livestock products have contributed greatly to the decline of this sector. Although once a booming industry, wool production is no longer the focus of the sheep producers; now production is oriented more toward the market for lamb meat than wool, which may be attributed, at least in part, to the government's price support system for lamb production (Tamames; Briz).

The sheep and goat sector is probably still the most traditional of all the livestock industries, but intensive production methods have increased in recent years. The movement toward intensive production systems has shifted sheep and goat production form the traditional regions of Extremadura and Castile-La Mancha to the Duero and Ebro Valleys. The traditional Spanish Merino breed, a long-wooled, stocky breed, native to Spain, has declined in favor of other domestic and foreign "meat-type" breeds. Because sheep and goat milk is used in the production of some of Spain's most popular cheeses ("Queso Manchego" and "Queso Cabral," respectively) lambs and kids are weaned early to provide more milk for cheese. Then, the ewes and lambs,

she-goats and kids are usually fed concentrates for a little while before being put on pasture (Tamames). Only about 15 percent of the sheep and 5 percent of the goats are kept in confinement and fed concentrates. Lamb meat is clearly the most important output of this livestock sector, (accounting for 90 percent of all sheep meat), but milk, and wool production are also relatively significant (Briz; Peterson, et. al).

Chapter III

SPAIN AND THE EUROPEAN COMMUNITY

This chapter begins with a brief description of the European Community (EC), followed by a discussion of the CAP and possible changes of that policy that are likely to occur due to increased budgetary problems associated with enlargement of the Community. The majority of this chapter, however, is devoted to a summary of the Spanish beef sector within the context of the EC which includes a discussion of the possible effects that adherence to the CAP may have on beef and veal production in Spain.

The European Community

The European Community (EC), formerly known to many as the European Economic Community or EEC, was founded during the reconstruction and recovery Western Europe following the end of the Second World War. The motivations of the original six members (West Germany, France, Italy, Belgium, The Netherlands, and Luxembourg) in forming the Community were both political and economic. It was hoped that closer cooperation between member nations would reduce the likelihood of a reoccurrence of the major military conflicts that had devastated Europe throughout history (Hill; Wallace). Also, the prospect of a large, affluent 'common market,' which would be free of impediments

to intra-Community trade and which would have strong preference for Community-produced goods, provided a very strong economic inducement for the formation of the EC in the mid-1950's. Thus, although political considerations surely played a role in the creation of the Community, one cannot deny the importance that economics had in providing the impetus toward the integration and unification of Western Europe (Schmidt).

It was in March of 1957 that representatives of 'the Six' met in Messina, Italy to sign the Treaty of Rome which formally established the EC and in which the formation of a common customs union for both industry and agriculture was envisaged. More specifically, the six signatories agreed that the basic objectives would be to establish a customs union with free movement of goods, services and persons between the member states; to progressively harmonize the economic policies of the member states; to increase economic and political stability; and to raise the standard of living of the rural population and of the Community as a whole (Hill; Noel).

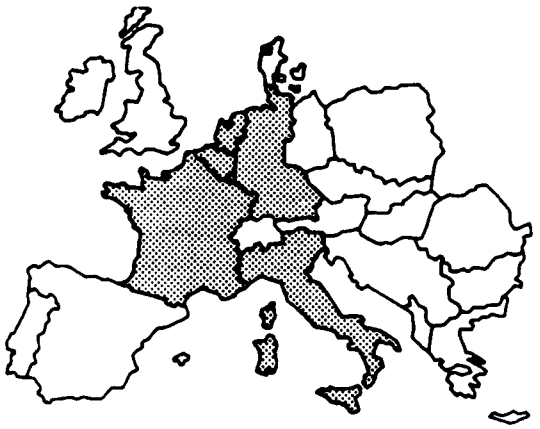
Since the formation of the EC, the Community has undergone two periods of expansion and has doubled its membership (the EC is currently comprised of twelve member countries). In 1973, the United Kingdom, Ireland, and Denmark joined the EC, followed by Greece in 1981, and on January 1, 1986 Portugal and Spain became full members, thus

completing the 'Mediterranean Enlargement' of the Community.

Figure 3.1

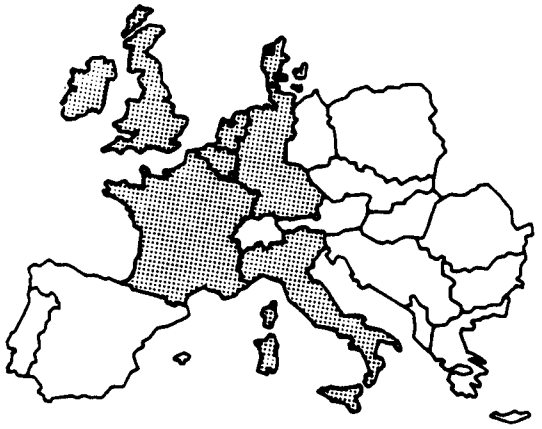
Growth of the European Community

EC-6



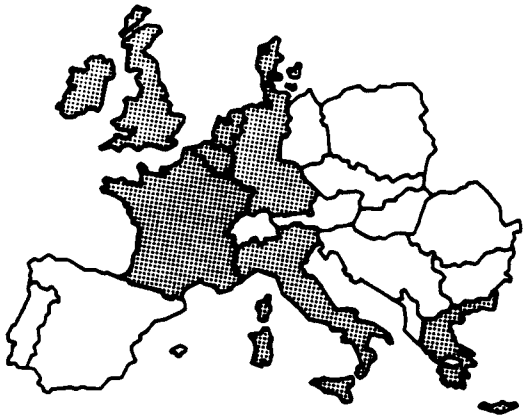
1957
- Belgium
- Federal Republic of Germany
- France
- Italy
- Luxembourg
- Netherlands

EC-9



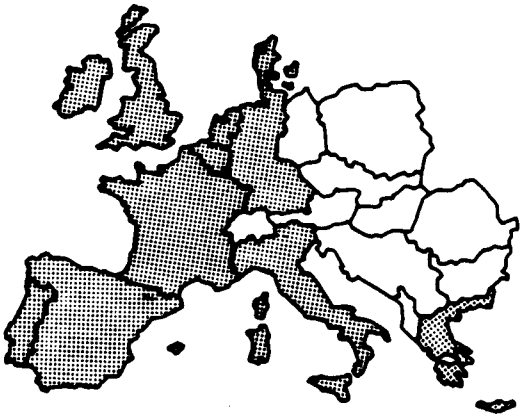
1973
- Denmark
- Ireland
- United Kingdom

EC-10



1981
- Greece

EC-12



1986
- Portugal
- Spain

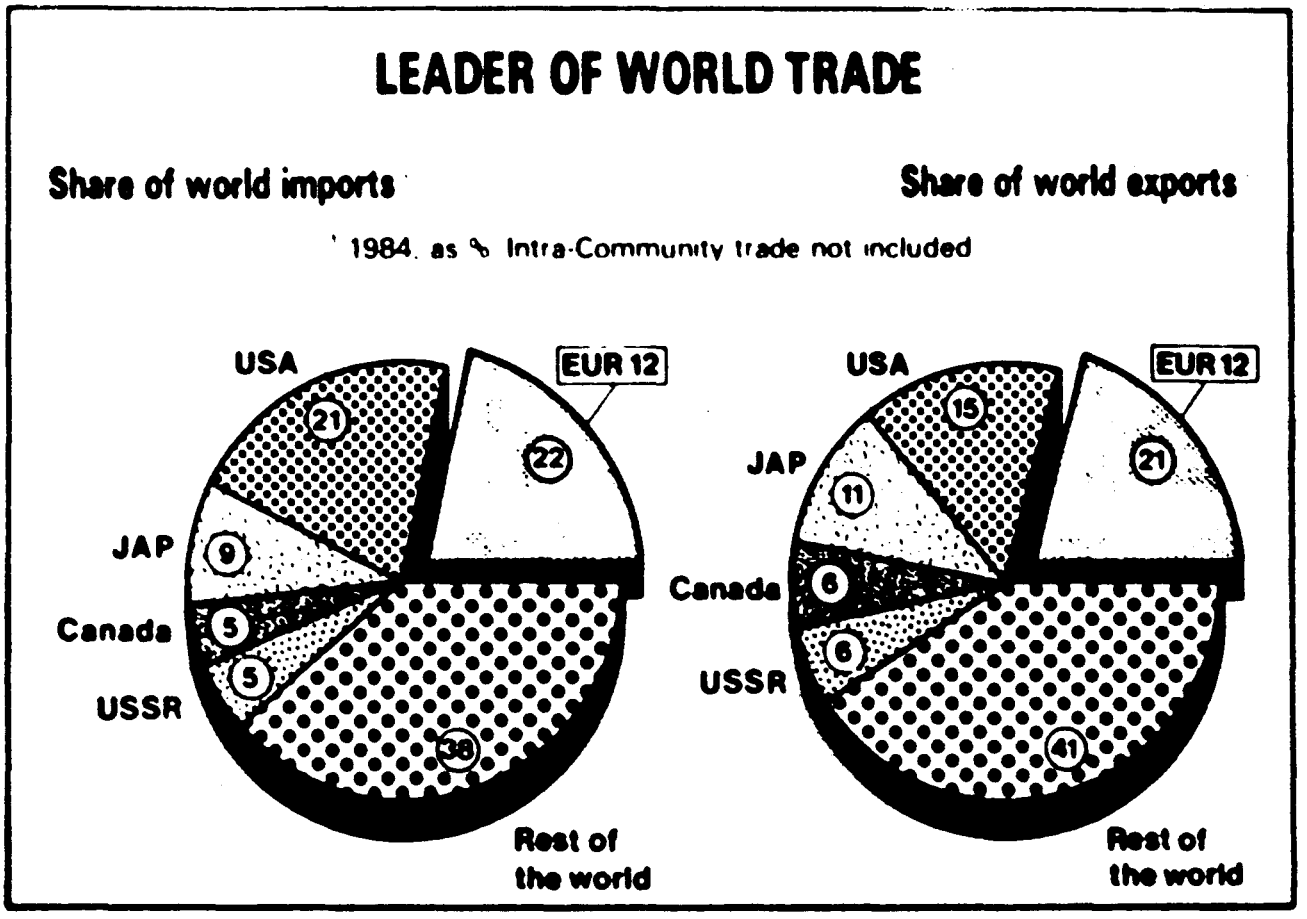
In addition to the twelve member nations, the Community maintains preferential trade agreements with several other nations of Africa, Latin America, and the Pacific Rim. The Community is also a significant contributor to food aid programs and other Third World development projects.

Despite the grand differences in the agricultural sectors of 'the Six,' agriculture had to be included in the Rome Treaty because of its importance to the economies of the member nations and because of the political lobbying power of the Community's farmers. Hence, the creation of a common agricultural policy was one of the economic policy objectives outlined in the treaty, but details of the policy were not explicitly stated until 1962 and the policy's mechanisms did not become effective until 1968 (Hill; Duchene).

Since the implementation of the CAP, there has been a major turnaround in the agricultural trading position of the EC. The Community has changed from being a net importer of temperate zone agricultural products to being the largest exporter (having surpassed the U.S. in 1986) and a major competitor with other traditional exporters of agricultural products including the United States, Canada, Australia, and Argentina (Bureau of Agricultural Economics; Commission, 1987). (The CAP will be discussed in greater detail in the next section.) The EC-12 is also currently the world's principal commercial power, as shown by its share of world

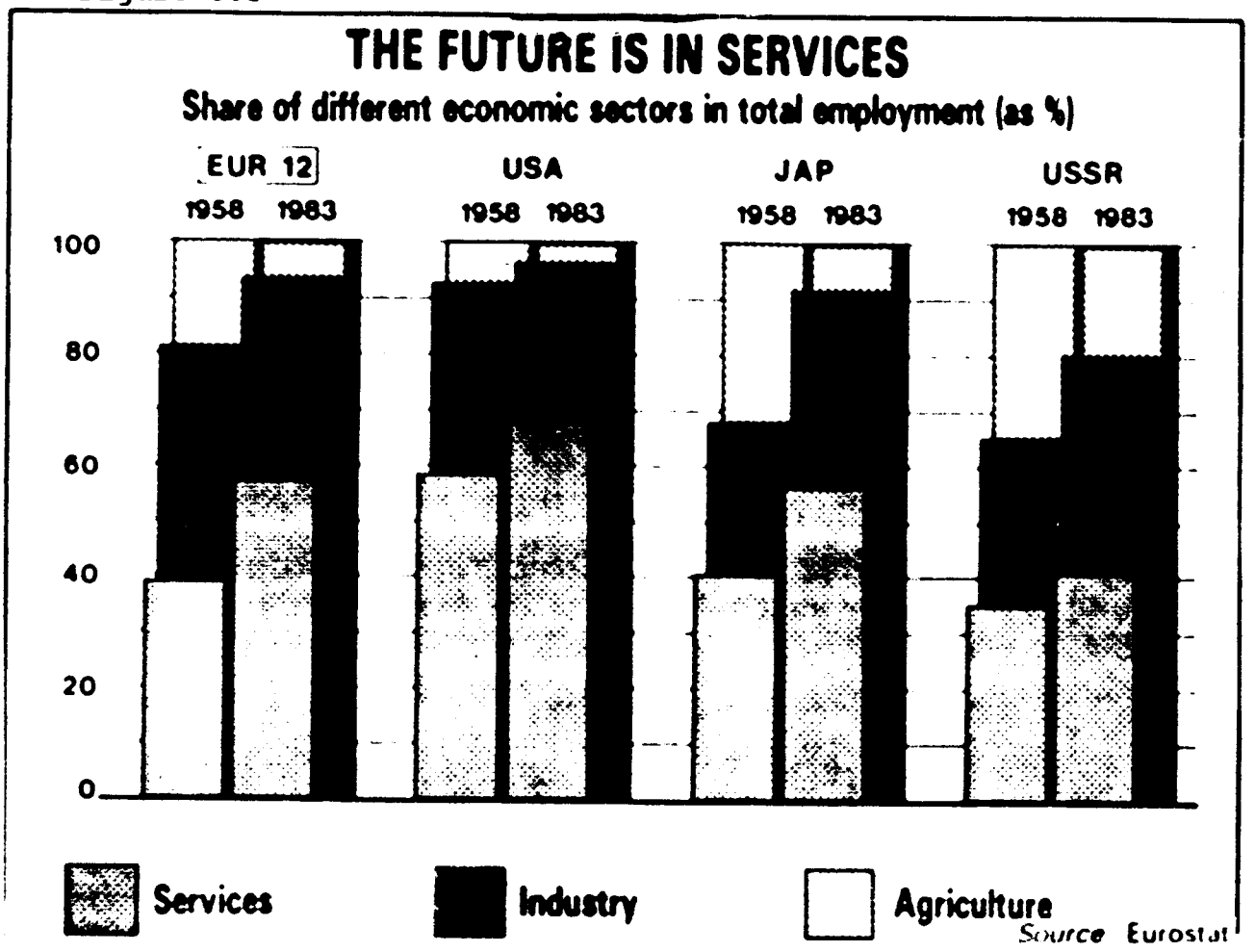
trade, not including commerce between the twelve members (see figure 3.2). West Germany, the United Kingdom, France, and Italy are responsible for the bulk of this trade but if it were measured in relation to the number of inhabitants in each country, the densely populated countries of Belgium, Luxembourg, the Netherlands, and Denmark would surely figure among the leaders (Commission, 1986a).

Figure 3.2



In the Community as in other developed countries, the service sector provides the greatest number of jobs, more than industry or agriculture whose share of employment has been steadily declining over the years (see figure 3.3).

Figure 3.3



Still, agriculture is very important in the Community and contributes significantly to the economies of the EC's newest members, Greece, Spain, and Portugal. Thus, one may argue that the creation of the Common Agricultural Policy, which has unified the agricultural policies of the EC members and transformed the Community from an importer to an exporter, may be the most significant achievement of the Community and the cornerstone of the market, or as Josling has put it "the jewel in the Crown" (1982; p. 3). But one certainly cannot deny that the wider market in industrial

goods and the freer movement of labor have also been important achievements of the EC. Either way, it is the CAP that has always demanded so much attention; the CAP which has been the focus of much criticism and debate both inside of the Community and out; and it is the CAP (and pending modifications of it) that directly concerns the Spanish farmers.

The CAP

A typical feature of growing economies is the continuous change in production with particular relevancy to increases in agricultural production. Since food products face an inelastic demand and the income elasticity of many foodstuffs is less than unitary in affluent societies, the contribution to the GNP form agriculture tends to decrease as the average income per capita rises (Engel's law); therefore, farmers are constantly facing a problem of decreasing incomes as production increases. Farmers' profit margins are 'squeezed' out in the long-run. Consequently, typically high rates of productivity create surpluses of agricultural products, and hence, in a 'free-market' economy, depress farmers' incomes relative to incomes earned in industry and services (Commission, 1987). This is why the 'farm problem' has always been such a big issue, not only in Europe, but throughout the world.

Long before the creation of the EC, many people felt

that the agricultural sector should share in the increasing prosperity, irrespective of prevailing market conditions. And in Europe, mainly because of the political influence that European farmers have historically enjoyed, there has been a long history of agricultural protectionism (Newman et.al.). So, when the EC was founded in 1957, all national governments were already supporting farmers' incomes in a variety of different ways because it was politically unacceptable to renounce the 'parity concept' between agricultural incomes and the incomes of those persons employed in other sectors of the economy. Therefore, since a free market for agricultural products did not exist at the national level in any of the six original members, a common market for agricultural products seemed logical and feasible, hence the birth of the EC's Common Agricultural Policy (CAP) (Hill; Newman et. al.).

The CAP is a system of policies developed to achieve the objectives of farm income support, increased agricultural productivity, promotion of technical efficiency and efficiency of resource use, price stabilization, and food security. All of these policy objectives were laid down in Article 39 of the Rome Treaty and are achieved using a variety of different price and market mechanisms (Bureau of Agricultural Economics).

Although promoted as a policy to benefit both EC producers and consumers, the real aim of the CAP is to

secure for the Community's farmers stable and reasonably high incomes. The policy rests on devices that determine the prices of various agricultural commodities and which regulate the access of third countries' exports to the EC. Structural policies, also envisaged in the Treaty of Rome to improve the farmers' position and increase productivity, have so far been rather modest. The common feature of the different market organizations is that the guaranteed prices within the Community tend to be well above world market prices and tend to fluctuate less because the market is protected from outside competition (Hill; Bureau of Agricultural Economics; Duchene).

The three fundamental principles upon which the CAP has been based are:

(1) free movement of agricultural goods within the Community;

(2) Community preference; and

(3) joint financial responsibility.

The single market principle guarantees the formation of a domestic market organized on the basis of a centralized agricultural policy, common for all members. Community preference, a logical consequence of a single market, establishes measures that protect the internal market against low-priced imports and extensive price fluctuations in world markets. Finally, joint financial responsibility is assumed by EC members states through the European

Agricultural Guidance and Guarantee Fund (EAGGF) (Commission, 1987).

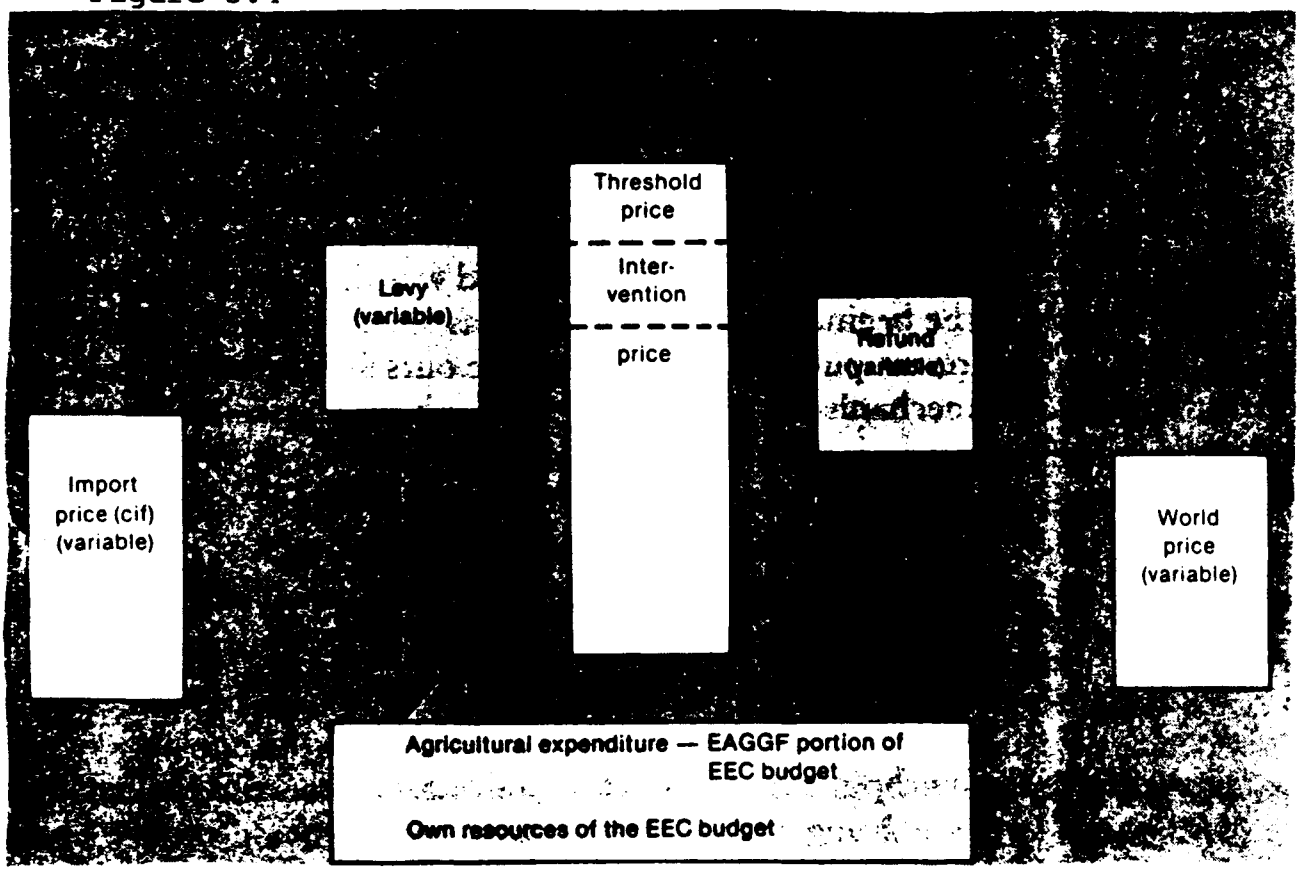
Under the CAP, by far the greatest emphasis is placed on manipulation of the agricultural markets through price and commercial policies. Different support regimes have been developed for the various commodities, but for many of the most widely produced commodities in the Community, the system of price support and market regulation has been based on three principal instruments:

> (1) variable levies on imports, to ensure that imports from other countries do no enter the Community at prices which are below the domestic support levels, or threshold price;
>
> (2) intervention purchasing arrangements, under which the EC agrees to purchase surpluses of agricultural production in order to prevent the market price for any given commodity to fall below the specified intervention price; and
>
> (3) variable export restitutions, to 'bridge the gap' between the high internal market prices and the prevailing world market price for any given commodity that is to be exported (Commission, 1987; Bureau of Agricultural Economics).

Again, different products have their own market organizations based on the specific characteristics of each output, but they all basically follow the model of the

cereal market organization, first introduced in 1962. The cereal market is often used as the "classic example" that best explains the policy mechanisms used in accordance with CAP principles. Figure 3.4 demonstrates these mechanisms as they apply to the EC wheat market.

Figure 3.4

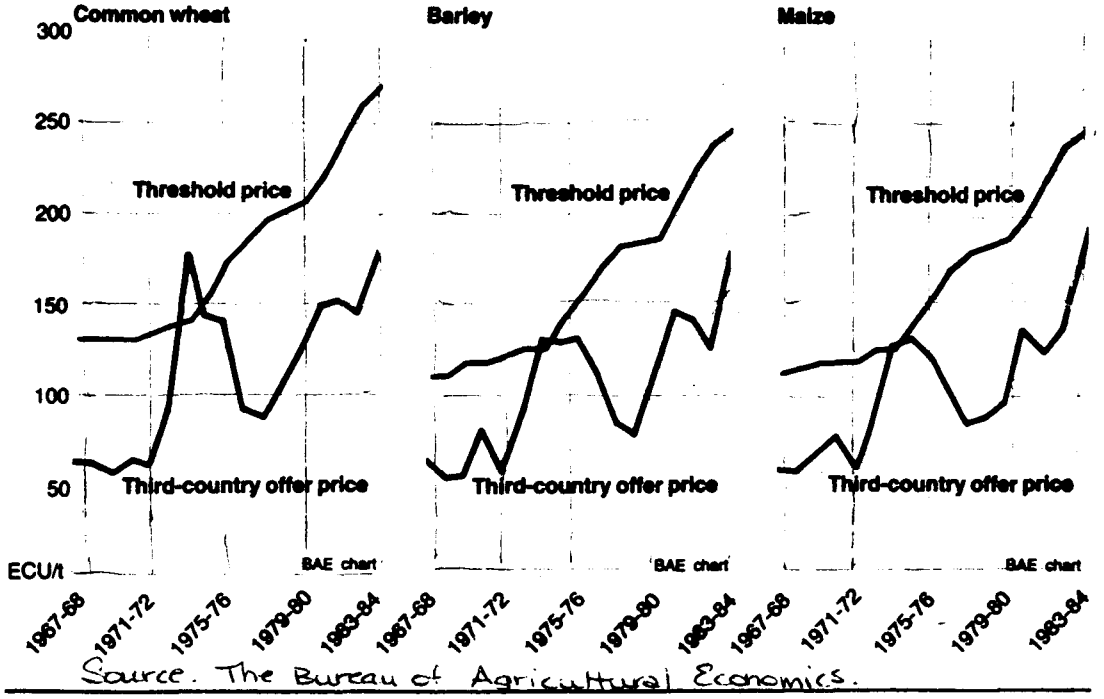


Three prices, set at the beginning of each marketing year by the Council of Agricultural Ministers, are the basic policy tools of the wheat market organization. The target price indicates the "desired" level of price farmers should receive for their product, and is based on farm income and macroeconomic considerations. If the internal market price for wheat falls below a certain limit, the Community

intervenes to stabilize the market by offering to buy wheat from the farmers at the intervention price. This price is also fixed in advance and represents a guaranteed minimum price for EC wheat producers. However, EC producers do not receive a deficiency payment in the case where the internal price falls below the established target price.

In order to meet the second CAP principle, Community preference, the threshold price is set for wheat imports whose price is lower than the Community price. The threshold price is calculated as the difference between the target price and the costs of unloading and transporting imported wheat to the major consumption areas of the Community. The threshold price for grains has been considerably higher over the years thatn the third country offer price (i.e. world price for grains) and has been increasing at a steady rate over the years. (Figure 3.5).

Figure 3.5 **Threshold prices and third-country offer prices for EC grains**



Source. The Bureau of Agricultural Economics.

The difference between the threshold price and the import price is charged as a variable levy on imported wheat (the levy is "variable" because import prices vary, while threshold prices are set in advance). Exporters of wheat from the Community receive export restitutions, or variable refunds to make up the difference between the high internal market price (including transportation costs to the EC port of export, Rotterdam) and the lower prevailing world market price (Commission, 1987; Hill; Bureau of Agricultural Economics). The major commodities besides wheat which have their prices underpinned by this system of variable levies, EC purchases, and export subsidies include most other cereal grains (except durum wheat), milk and other dairy products, beef and veal (as seen in figure 3.6), mutton and lamb, and sugar.[9] Clearly, this constitutes the majority of the EC's agricultural exports, and obviously this system represents quite a financial burden for the EC budget.

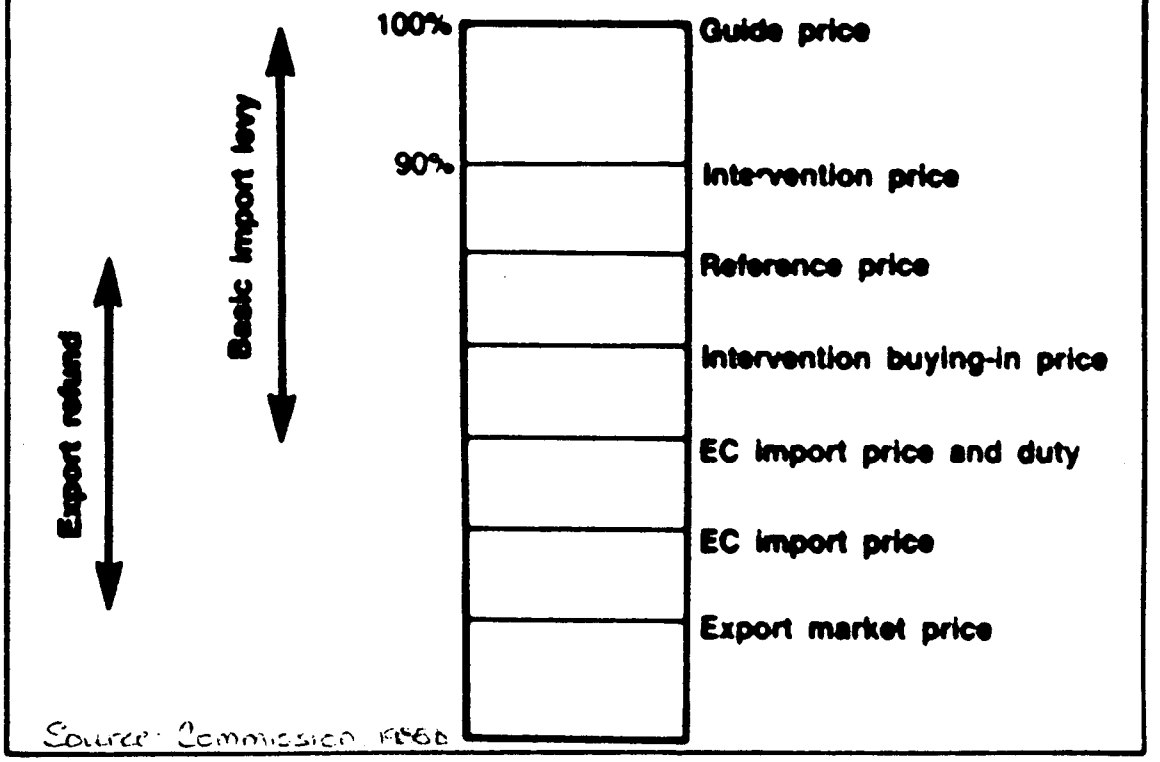
The principle of joint financial responsibility is met by expenditure of the EAGGF portion of the EC budget. Variable levies constitute contributions to the Community's own financial resources, while government purchases at intervention prices and export refunds contribute to the

---

[9] As an exception to the strict protectionist structure of the CAP, oilseeds (soybeans, rapeseed, sunflower seed, etc.) and grain substitutes were excluded from the application of the CAP as a result of the Dillon round of GATT negotiations. However, although soybeans are exempt from variable levies, soybean meal is not.

agricultural expenditures of the Community. (Commission, 1987; Hill; Josling).

Figure 3.6 **EC beef and veal support measures**



In addition to the pricing and market support instruments mentioned above, farmers often receive subsidies to help them pay for the storage of surpluses, low interest loans to help them mechanize or expand their farms, and quotas are placed on imports that compete with products that are produced domestically. Also, for some commodities including poultry meat and eggs, and pork, a principal objective of the support mechanism is to ensure that EC producers are not disadvantaged as a result of their having

to pay relatively high prices for domestically produced inputs. For such items, minimum import or sluicegate prices are based on the costs of production, which are related to, among other things, the prices of domestically produced feed. To ensure that the sluicegate prices represent effective minimum import prices, a variable levy is charged on imports which brings the price of these imported meats up to the domestic market price and thereby protects EC producers from imports which, if no levy existed, could be sold at lower prices (Commission, 1985a; Bureau of Agricultural Economics).

Deficiency payments are also used in the Community's support regime. Deficiency payments, or direct income transfers, are often made to producers of oilseeds and a few other minor crops like cotton and tobacco which are not protected by variable import levies. These payments are often used in instances when it is deemed desirable to maintain relatively low market prices to please the consumers, while at the same time providing supporting the incomes of the producers (Commission, 1987). In some areas of the Community, wine and sheepmeat fall into this category of the CAP's support regime (Hill).

Decisions on price support levels are based on the notion the prices should be set so as to allow modern, efficient farms to remain in that status. To accomplish this goal, the Commission of the EC annually examines the

cost structure of a set of representative farms and uses these farms to determine the price levels required to maintain agricultural incomes. Since the determination of the actual support prices is carried out in the political arena, prices tend to be considerably higher than they would otherwise be if the criterion that incomes on efficient farms should be maintained was strictly applied. In recent years, this tendency toward high internal prices has been countered, at least in part, by the growing problem of surplus disposal and the budgetary pressures resulting from substantial intervention purchases. Thus, if the CAP is going to have a future, changes must be made to offset the increasing cost of implementing the policy (Josling).

Spain and the Community

In July 1977, having surmounted the political difficulties raised during the Franco regime[10], the young Spanish democracy requested full membership into the EC as the country was no longer pleased with the preferential trade agreement of 1970 (Carr; Alonso). The desire for international recognition was combined with the need to strengthen the weak social democratic government of Adolfo Suarez, but Spain did not become a full member of the

---

[10] Spain originally applied for full EC membership in 1962, but the application was met with complete silence by the Community because of their disapproval of the country having been under authoritarian rather than democratic rule.

Community until January 1, 1986, after eight years of negotiation (Felipe Gonzalez was Spain's president by that time). Agriculture was the main reason why the negotiations were so long and complicated. Since Spain is a major agricultural country, many difficulties concerning the inclusion of the country's agricultural sector into the CAP arose during negotiations. Furthermore, French and Italian farmers lobbied against the accession of Spain because they feared increased competition. To complicate matters even more, Spain's application for membership came during talks of reforming the CAP and Spanish agricultural producers wanted some guarantee that they, too, would enjoy the same privileges afforded to farmers in other member states.

Although the negotiation process was long and arduous, there was little doubt that Spain would eventually become a member of the Community (Carr; Alonso). There was very little internal debate in Spain about the subject of EC membership--according to an opinion poll taken in 1979, 67% of the people questioned were in favor of Spain's proposed entry into the EC, only 7% were against it, and 28% fell into the 'don't know' category (Ruperez). Moreover, all the major interest groups, including industrialists, trade unionists, and farmers had taken a favorable stand. There are at least two important factors which help to explain this extraordinary unanimity in Spain. The first is the simple fact that the European option had been decided while

Franco was still in power. However, since the Community adopted the position that Spain could not become a full member until a parliamentary democracy was restored, the EC became almost a symbol of democracy for most Spaniards (Carr; Ruperez).

Furthermore, entry into the EC would mean the end of international isolation and most Spaniards believed that Community membership would be a great step forward. The other factor which probably contributed to the popularity of EC membership among Spaniards was the hope that entry into the Community would provide an opportunity and an excuse for internal economic and social reforms. Spain, which has been somewhat of a laggart in Europe throughout most of the 19th and 20th centuries, had remained economically backward and politically isolated for many years; therefore, many people saw EC membership as a way to close the gap between the Spanish economy and that of her neighbors to the North. Thus, while both the Spanish government and the Community attach much importance to the political dimension of the Community, many Spaniards have associated membership with the internal economic reforms which the previous dictatorial regime proved unwilling or unable to bring about. In fact, many authors speculate that if it were not for the probable economic benefits Spain should gain as an EC member, Spanish politicians probably would not have strived so hard to reach an agreement with the Community (Carr; Ruperez; Banco

Central de Espana, 1983a; Alonso).

Economic prosperity and political stability are ideals inherent in the idea of a "Unified Europe," but it will take a concerted national effort for Spain to reach the heights achieved by other Community members. If Community membership leads to increased economic prosperity it will also help strengthen democracy, lessen social disparity, and boost political support for European integration. However, this will depend on the international economic and political environment; on whether or not long overdue reforms are made in the Community's policies (especially with regard to reforms of the CAP as will be discussed in the next section); and whether or not Spain as a whole can "rise to the occasion" and meet the many challenges that the country faces as it tries to integrate its economy, institutions, and political ideology into that of the enlarged Community.

Policy Changes

However welcome by EC farmers, the CAP costs the consumers and the taxpayers, not to mention the adverse consequences that many non-aligned countries throughout the world have suffered because of the policy. (See figure 3.7 for an example of EC transfers from consumers to Community producers for the period 1971-84.) It is estimated that, over the past decade, about 60 percent of the value added by agriculture in the Community has come from EC consumers and

taxpayers by way of transfers and subsidies, and it is further estimated that the CAP has depressed world prices of major temperate zone agricultural products (by supporting excess production and then 'dumping' surpluses on world markets) by, on the average, 16 percent (Josling; World Food Institute). Obviously, changes some changes should be made which is precisely what the EC is doing in lieu of the increased costs of implementing the CAP in the enlarged Community.

Figure 3.7 **Estimated transfer costs as a result of EC support measures for grain** In 1982 values

Year	From consumers to producers a	From taxpayers b: Export restitutions	From taxpayers b: Intervention measures	Total
	'000m ECU	'000m ECU	'000m ECU	'000m ECU
EC-6				
1971-72	7.1	1.2	1.2	9.5
EC-9				
1972-73	5.1	1.3	1.2	7.6
1973-74	-2.7	0.2	0.7	-1.8
1974-75	1.2	0.7	0.5	2.4
1975-76	3.4	0.7	0.4	4.5
1976-77	8.8	0.6	0.4	9.8
1977-78	10.0	1.2	0.4	11.6
1978-79	10.1	1.6	0.5	12.2
1979-80	8.1	1.4	0.6	10.1
1980-81	5.6	1.3	0.8	7.7
EC-10				
1981-82	6.7	1.1	0.8	8.6
1982-83	7.9	1.4	0.9	10.2
1983-84	5.1	1.0	0.7	6.8

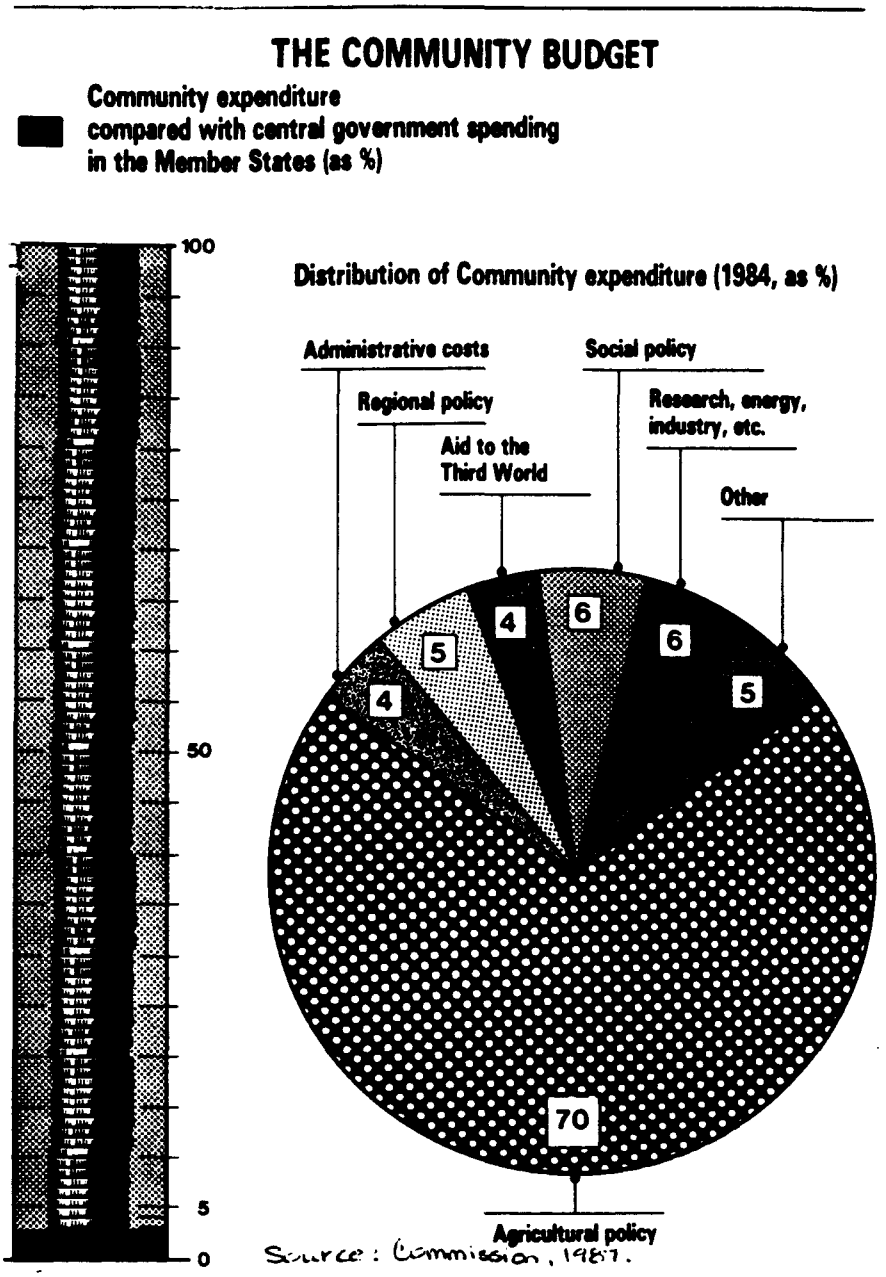
a After allowance for the estimated effect of EC support policies on world grain prices. b For calendar year; that is, 1972 for 1971-72.

Source: Based on data from the Commission of the European Communities (1985a, and previous issues).

Source: The Bureau of Agricultural Economics.

At present, the CAP accounts for nearly three-fourths of the EC budget and a relative amount of time and energy is devoted to it (see figure 3.8), but most of the spending does not reach the farmers in the form of additional income.

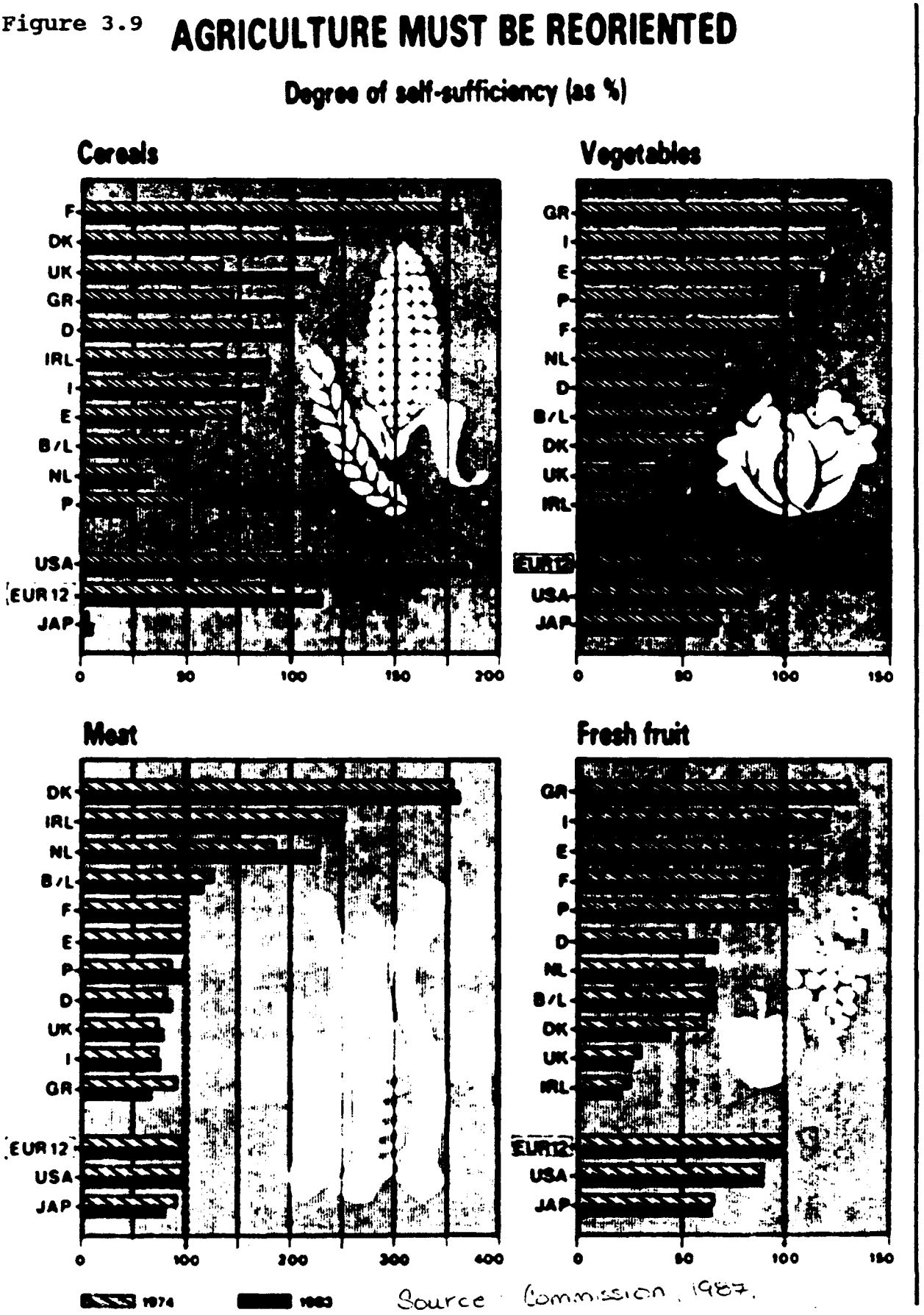
Figure 3.8



Even so, perhaps even more alarming than the amount of CAP expenditure is the fact that agricultural resources are being wasted as a result of the policy (Josling; Duchene). At present the EC is nearly self-sufficient in the production of vegetables, is self-sufficient in the production of fresh fruit, milk, beef and veal, pork, lamb and mutton, and poultrymeat, and is more than self-sufficient in the production of cereal grains. This remarkable turnabout in the trading position of the EC is primarily due to the CAP's support system which encourages farmers to overproduce and has resulted in the accumulation of massive surpluses (See figure 3.9).

If no changes were made in the CAP, the inefficient allocation of resources would probably continue, the cost of maintaining the farmers' incomes in an enlarged Community would increase, and the EC would likely face even worse budgetary difficulties. However, with the enlargement of the Community, the CAP is being reviewed and in all probability will undergo some major changes. Although the CAP is likely to be reformed, the principle of accepting the totality of EC legislation means that any changes made in the CAP resulting from enlargement are not necessarily going to be in response to the particular needs of the new members (Josling; Hill).

Figure 3.9



Source Commission, 1987.

Since the early 1980's, there have been limited reforms of the CAP--faced with problems of financing its agricultural support, the EC decided to take measures to restrain expenditures. Those taken so far have arisen mainly from reviews of the CAP in 1981 and 1983. The principal measures have been the application of the threshold principle, quotas on milk and other dairy products (the EC's main budget expenditure item), more stringent intervention arrangements, and proposed disciplines on future total EC expenditure and agricultural expenditure. There has also been wider application of co-responsibility levies, which were first introduced in 1977 (Commission, 1985b). Unfortunately, the success of these reforms has been limited. For example, even with the quota reduction on milk, EC milk production exceeded domestic consumption by over 15 percent in 1986 and the huge dairy product stocks were only slightly diminished that same year. Another example of the ineffectiveness of the reforms is that despite price increase restraints on several products for which surpluses exist (e.g. cereals, particularly wheat; beef and veal; wine), production has continued to increase. Thus the degree of these price restraints has been insufficient in slowing production growth and the generation of surpluses (Duchene; The Bureau of Agricultural Economics). The co-responsibility levies are primarily a revenue raising instrument, which has a relatively small

impact on production and so it, too, has not been very effective in decreasing EC expenditure (Josling).

Although thus far reform of the CAP has been slow, there is a great interest in and considerable pressure for future reforms. In addition to the pressures from consumers and taxpayers within the Community, the U.S. and Canada have been exerting pressure on the EC to reform the CAP (Josling). So, since within the Community there is acknowledgement of the need for change in the CAP, the EC is again reassessing its policies and any future developments will undoubtably affect agriculture in Spain (and all the other member nations). However, since the necessary changes are still being debated within the EC, it is impossible to guess what changes may result in the near future. But a comparison of Spanish and EC policies clearly indicates how Spanish policy will change now that the country is part of the EC. These changes and their effect on the livestock sector (with particular emphasis on reforms affecting beef and veal production) is discussed below.

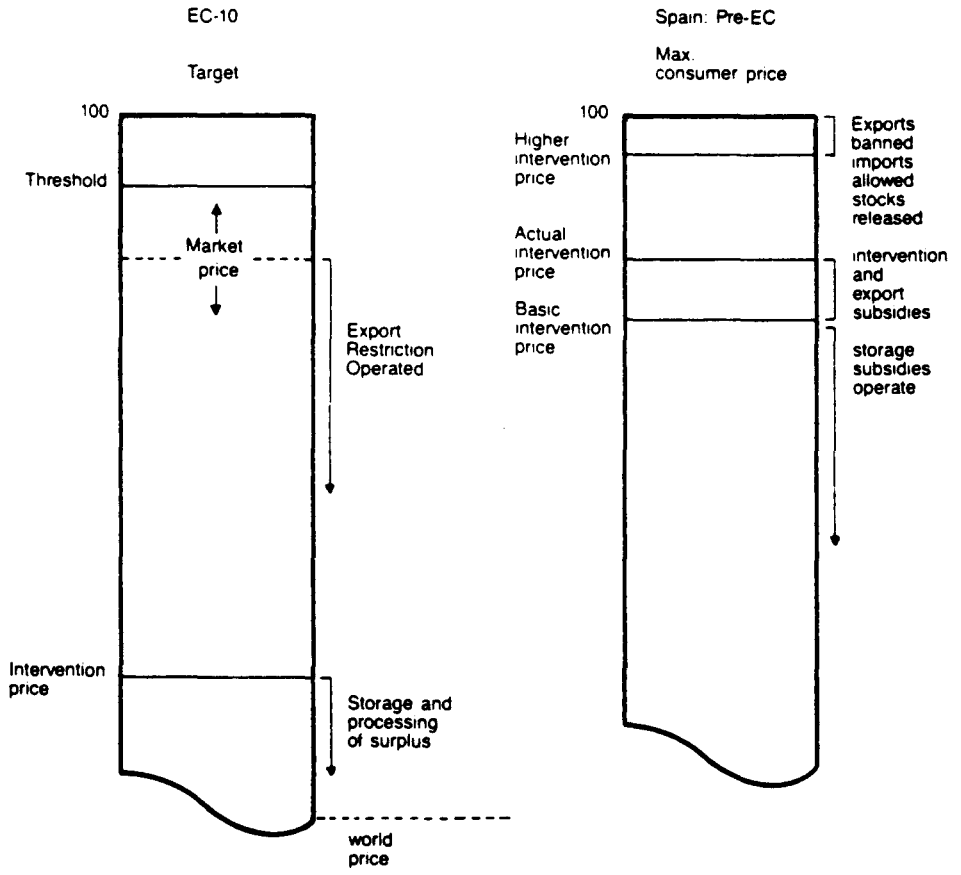
The Spanish Livestock Sector in the EC Context

Because the support mechanisms of Spain's market and price policies were already very similar to those of the EC's, including variable levies and the equivalent of target and intervention prices (See figure 3.10), adoption of the CAP will affect intervention levels and commodities covered

rather than introduce new and unfamiliar management methods (Kelch; Peterson et. al.).

Figure 3.10

Graphic Comparison of Spanish and EC Agricultural Support Systems.



Source: Agra Europe, Special Report No. 26 (Brussels, Belgium), August 1985, p. 10

During the seven year "conventional" transition period, which began on March 1, 1986 and will continue until January 1, 1993 (a ten year transition period was negotiated for 'sensitive' horticultural products), Spain will gradually adopt the CAP. Adoption of the CAP will lead to changes in relative prices, production, consumption, and trade during this transition period. At the end of the transition period, it is expected that the country will have reached a level of development as close as possible to that of its northern neighbors (Banco Central, 1983a).

During the transition period, application of the CAP will be delayed because immediate application of the CAP in absence of monetary manipulations would significantly change price-support levels for almost all agricultural products. But because the transition period has been granted and exchange rates may be manipulated (the agro-monetary system of the EC is a very complex system based on so-called "green-rates," a specific agricultural exchange rate, and monetary compensatory amounts, MCAs), the simple peseta equivalent of current EC prices, which are expressed in European Currency Units (ECUs) and not national currencies, will not be imposed (Commission, 1986a; Tio). Instead, prices will be aligned gradually and in several steps and the EC's production control and pricing mechanisms are gradually being phased in.

During the transition period, prices which were lower

than EC prices (which includes virtually all agricultural products) will be gradually raised, while prices which were higher (beef and olive oil) will be lowered by 12.5 percent per year until the price is within 15 percent of the price in the EC, at which time the latter will be applied. In cases where there was a minimal difference between the 1986 Spanish price and EC prices, EC common prices were applied immediately (Tio).

As of March 1, 1986, Spain began to dismantle its barriers to intra-Community trade and instituted the CAP's common customs tariffs and set quantitative restrictions on imports in accordance with the CAP (Agra-Europe 1985; The World Food Institute). The first step in this dismantling process was the replacement of Spain's fixed 20 percent import duty on grains with the Community's variable levy. This means that even though internal Spanish prices are gradually equalized with EC prices over the transition period, the variable levy on imported feedgrains has been in effect for almost as long as Spain has been an EC member (i.e. 3 1/2 years). This change has tended to increase domestic grain prices by 11 to 15 percent (The World Food Institute). Over time it is likely that the increases in grain prices will tend to encourage grain production, discourage grain feeding, and encourage the use of grain substitutes such as manioc or cassava, corn gluten feed, and grain milling by products (Tio). Thus, it is clear that the

beef sector is likely to suffer because of the adoption of EC policies, but to what extent production will decrease has yet to be quantified since accession.[11]

Adherence to the CAP has also lead to the elimination of most of Spain's agricultural subsidies. Input subsides are not permitted under the CAP, although direct production aids are allowed for a small number of products. Spanish policy has relied heavily on credit and other input subsidies to maintain farm incomes without rising consumer prices (Tio).

The current Spanish system of state trading for livestock products and cereals will be modified by the end of the transition period and those Spanish institutions which administer price and market policies (FORPPA, SENPA, and CAT) will have to be restructured and coordinated with the European Agricultural Guidance and Guarantee Fund (EAGGF), the agency in charge of administering the CAP's price and marketing components. (These institutional changes may affect Spain's production, consumption, and trade as much as the shift in relative prices, but this study only assesses the effect of relative price changes on the production of beef and veal because institutional changes are far more difficult to assess.)

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[11] There have been some studies that have predicted declines in production and consumption of livestock products, but they were conducted prior to 1986 (See Peterson et. al., U.S.D.A.-F.A.S., 1979; Agra-Europe, 1980; Briz).

With respect to price changes in the livestock sector, Spanish intervention prices for poultry meat and eggs will have to be eliminated since the EC does not currently support their production vis-a-vis price intervention. However, poultry and egg imports are subject to the basic variable levy and a supplementary levy is imposed if the entry price is below a sluicegate price (Peterson et. al.). Since Spain does not import large quantities of poultrymeat or eggs, producers will not be directly affected by the restrictions on imports, but they will lose their guaranteed price supports, which could adversely affect production.

The new sheep meat policy of the EC allows member nations to establish their own policy prices; thus, Spain's current system may be left in tact. However, if the sheep meat sector is to expand, considerable adjustments in production systems will be required. The authors of a study conducted in Spain believe that the sheep sector will not be hurt by accession because of the EC's new policy of allowing members countries to set independent target prices (Briz). Still, the sheep meat sector will probably undergo several changes during the transitionary period as the sector makes its shift from the traditional production of mutton and goat meat and wool to specialized lamb production. This will require investment and changes in the current production practices and structures.

As for the production of swine, no direct changes must

be made in the support mechanisms for pork as those currently employed by Spain are in accordance with those of the EC, but the sector will still be affected by changes in producer prices. Fortunately for swine producers, current producer prices in the EC are about 8 percent higher than prices received by Spanish producers (Herlihy; Commission, 1985a) and this has been the case throughout the latter half of the 1970's and early 1980's. In lieu of the price differential at the time, the authors of the FAS study concluded that the modern swine sector in Spain would continue to expand. They projected production of 1.2 mmt in 1990, and they noted that Spain could even export pork in the 1990's if the problem of African Swine Fever can be overcome (1979). Thus, it appears that the swine sector may actually benefit from EC accession, but one might speculate that even this sector may have done just as well or perhaps even better had Spain not become a member of the EC.

Because of EC support for dairy products and special incentives which are available to help the sector modernize production systems, milk production is projected to increase marginally during the transition period (Briz). A farm-level analysis conducted by the USDA's Economic Research Service indicates that, although higher feed costs and lower milk prices will reduce gross margins, large dairy operations will remain profitable under the CAP but many small dairy farmers may have difficulty adjusting to the

changing market conditions (Peterson et. al). An FAS report concludes that Spain will be unable to compete with other European countries in manufactured dairy products, but will be able to maintain its current self-sufficiency in fluid milk (1979).

Again, the livestock sector most likely to be harmed by the CAP is the beef sector. Beef and veal production is likely to be adversely affected because Spain's current support price for beef and veal will have to be reduced at the same time that Spanish beef producers see the price of their variable inputs rise. Beef and veal are two of the limited number of commodities for which support prices in Spain are higher than those of the EC (most of Spain's prices are considerably lower than those of the EC because production costs are lower which is why other EC farmers, particularly those in France, Italy, and Greece, feared increased competition). The effect of policy changes on the beef and veal sector will likely be twofold; production may be directly affected by the lower intervention prices for beef and veal in the face of rising production costs; and imports from other EC members may cause decreases in domestic production because the low level of development of this sector will keep it from competing with other EC producers (Briz; Peterson et. al.). Lowered consumption levels resulting from higher EC meat prices may also indirectly adversely affect beef production in the long-run.

However, regardless of changes that may occur with respect to the output of all livestock products, changes in input prices will undoubtably affect the entire livestock sector some extent. Before entry into the EC, Spain could import feedgrains at prevailing world market prices, but because of the variable levy on imported grains, producers now face higher feedgrain costs (as mentioned above). This increased cost of variable inputs may result in decreases in production if producers feel that they can no longer continue to produce at current levels given the rising costs of production.

In the next two chapters, the effect that price policy changes may have on the future domestic supply of beef and veal in Spain (the livestock sector which is likely to be hardest hit by price changes) is assessed and the results of the empirical analysis are summarized in chapter V.

Chapter IV

MODEL SPECIFICATION, METHODOLOGY, and PROCEDURES

In this section a model is developed to provide an indication of the effects of general price changes on the supply of beef and veal in Spain. In so doing, interactions between factors that influence changes in aggregate beef supply are examined and the author attempts to take into account the peculiarities of beef production in Spain. The data used in this analysis come from a variety of secondary sources[12] for the period 1970-1987. The supply function which was modeled was derived from principles of production economics as described in the section "Conceptual Framework." The beef and veal sector was chosen for analysis because (1) this sector is still probably the most "backward" of all the livestock sectors and it is undoubtably the most heterogenous; (2) this sector will likely undergo the greatest amount of structural, marketing, and price changes during the seven year transitionary period; and (3) many studies have predicted that accession will harm Spanish beef production despite the EC's slightly higher intervention prices for beef.

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[12] See Appendix B for a complete listing of the variables used and their sources. Also included is a description of all modifications of the data that were made.

Conceptual Framework

Agricultural production is more like the competitive model of microeconomic theory than probably any other industry. Farmers are clearly price-takers since individual producers (be they crop farmers or livestock producers) cannot affect either the prices that they must pay for agricultural inputs or the prices that they receive for their products. Farmers are, however, assumed to be rational profit maximizers, although this is the subject of much research and debate (Behrman; Just; Gardner and Chavas; Pope). Nevertheless, for this analysis, the hypothesis is maintained throughout that Spanish livestock producers are profit-maximizing, competitive price-takers whose production decisions are influenced by prices.

Because many Spanish livestock producers cultivate crops as well as produce various species of livestock, the production function (or input requirements) function relates all outputs and inputs (variable and fixed) as:

$$Q = f(X_i \ , \ X_{i+1} \cdots X_m \ / \ X_{m+1} \cdots X_n)$$

where Q = output; $X = [x_1,\ldots,x_i, x_{i+1},\ldots,x_m, x_{m+1},\ldots,x_n]$ and $x_1,\ldots,x_i$ are output quantities; $x_{i+1},\ldots,x_m$ are variable input quantities; and all of the variables to the right of the slash (/) (i.e. $x_{m+1},\ldots,x_n$) are fixed factors of production. These fixed input quantities and other exogenous variables are positive, outputs are positive, and variable inputs are positive (Debertin). The formulation in

this equation is abstract in that it does not specify how increases in the level of X_i by 1, 10, or 100 units would affect the level of output.

Duality

Duality states that the cost function is the inverse of its underlying production function, i.e. they are dual functions of one another provided that input costs are constant. Since the cost function is directly related to the profit function, this function also the dual transformation of the production function. Shumway analyzed the relationship between technology, supply, and demand using a dual approach (1983 p.749). According to the author, "with competitive behavior and regular technology, there is a one-to-one relationship between the technology and its dual transformation, the normalized profit function." He went on to claim that technology characteristics could be examined directly by a primal approach or indirectly by a dual formulation, but that "it is often easier to compute product supply and input demand relationships [in a multicrop, multivariable industry] from a dual model..."(1983, p. 751). Therefore, since duality theory is assumed to be applicable to the livestock industry, as with other multiproduct, multi-input industries, a dual approach to estimating the livestock supply function for Spain has been taken here.

Profit Functions, and Factor Demand and Supply Functions

Let's consider a farmer who faces a production function with the usual neoclassical properties,

$$Y = f(x_1,\ldots,x_m \,/\, z_1,\ldots,z_n)$$

where Y is output, the matrix X_i represents variable inputs, and the matrix Z_i represents the fixed factors of production. The profit (defined as current revenues less total current variable costs) is a function of output supplies and variable input demands. These, in turn, are specific functions of output prices, variable-input prices, and fixed-input quantities. This means that the profit function can be expressed as a function of the production function.

$$\pi = p(x_1,\ldots,x_m;\ z_1,\ldots,z_n) - \sum c_i' X_i$$

where π is profit; p is the unit price of output; X_i again represents variable inputs; Z_i represents the fixed inputs; and c_i' is the unit price of the ith variable input (Debertin; Lau).

The marginal productivity conditions for a profit-maximizing farmer are

$$p\{\partial f(X;Z)/\partial Xi\} = c_i' \quad i = 1\ldots m$$

And by defining $c_i \equiv c_i'/p$ as the normalized price of the ith input, this equation can be re-written as

$$\partial f/\partial X_i = c_i \quad i = 1\ldots m$$

and the profit can then be re-written as

$$\pi^* = \pi/p = (x_1,\ldots,x_m;\ z_1,\ldots,z_n) - \sum c_i X_i$$

where π^* is defined as the "Unit-Output-Price" profit, or the UOP profit for short (Lau, p. 12).

A profit-maximizing farmer wants to maximize his profit and minimize his cost, so he seeks to use the optimal level of variable inputs, denoted here as X_i's. These optimal quantities of variable inputs are functions of the prices of these variable inputs and of the quantities of fixed inputs,

$$X_i max = {}_i(c,Z) \quad i = 1...m$$

This equation can then be substituted into the original profit function to obtain,

$$\pi max = p(x_1^*,...,x_m^*;\ z_1,...,z_n) - \Sigma c_i X_i max$$

The UOP profit function is therefore given by,

$$\pi^* - g(p,\ c_1,...,c_m;z_1,...,z_n)$$

and on the basis of a priori theoretical considerations it is known that the UOP profit function is decreasing and convex in the normalized prices of variable inputs and increasing in quantities of fixed factors of production. Also, the UOP profit function is increasing in the price of the output (Lau;Debertin).

At this point, the advantages of working through subsequent derivations of the UOP profit function instead of the original production function should be emphasized. First, through a series of dual transformations, the Shephard's Lemma allows us to derive the supply function and the unconstrained input demand functions directly from the UOP profit function (we could also derive a supply function

from the indirect cost function) and without explicit specification of the corresponding production function (Shumway; Lau). The supply function can be expressed as,

$$\partial\Pi/\partial p = Y_i = g_n(c_1,\ldots,c_m;z_1,\ldots,z_n)$$

and the unconstrained input demand function would be,

$$\partial\Pi/\partial c_i = X_i = g_i(p, c_1,\ldots,c_m)$$

Another advantage to using the UOP profit function is that since we started with a production function we are assured by duality that the resulting output supply and input demand functions are obtainable from profit maximization of a firm or industry that has a production function which is concave in variable inputs (subject to given quantities of fixed inputs) and under competitive markets (Lau). (These conditions certainly apply to agriculture in Spain, although the assumption of "competitive markets" may not really hold). And the third advantage to using the UOP profit function is that the profit function, supply function, and derived input demand functions may be explicitly written as functions of variables which are normally thought to be determined <u>independently</u> of the farmer's behavior (Lau). Econometrically, this implies that these variables are exogenous variables, and given the assumption that farmers are profit-maximizers who face production functions concave in variable inputs and the short-run fixity of capital and land, the only variables which farmers can affect are the output and the quantities of inputs that they use in any

production cycle (Debertin; Shumway). A farmer can make decisions concerning the amount of output that he wishes to produce and the quantities of variable inputs he will use, but all of his decisions are dependent on his expectations of prices that he will pay for the inputs he will use and his expectations of prices he is likely to receive for the quantity of output that he produces.

Specification of the Model

Unfortunately, there is little to be found in U.S. literature with respect to livestock supply functions since most of the work which has been done with respect to supply functions has been done using data on annual crops. Numerous books may be found dealing with livestock response functions, but these books deal with the biological rather than the economic aspects of livestock production and, consequently, are of no use to aspiring agricultural economists who wish to model livestock supply functions. Still, the objective of the specification phase of this study was to develop a simple but reliable supply equation for beef which would then be used to predict and forecast the endogenous variable--the supply of beef in Spain. Naturally, in order to accomplish this objective, the specification of the model had to be based on sound theoretical framework. The author has already established the conceptual framework from which we can derive a supply function from a production function and in this section the

specific supply function for the Spanish beef sector is defined.[13]

In order to statistically estimate and forecast the supply of beef in Spain, variables which were hypothesized (based on economic theory) to have an effect on supply were incorporated in the supply function. However, only quantifiable variables were used in the supply equation and thus such variables as weather, structural changes, and political decision concerning livestock policy were not used although it should be acknowledged that such variables, however difficult to estimate, undoubtably do have an effect on the supply of livestock in any given country.

It was determined that a "good" livestock supply function should definitely include the following variables, four of which are in accordance with a priori economic theory (1-4) and two others (5 & 6) which seem reasonable to include: (1) the price of the output; (2) the price of the variable inputs; (3) the quantities or prices of the fixed factors of production; (4) technology; (5) the price of competing livestock products, i.e. substitutes for the product which is to be estimated; and (6) the price of all the complements for the livestock product to be estimated. Although it was determined that the last variable; namely,

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[13] The author wishes to express her deep gratitude to Dr. Tom Stout, Dr. Dean Baldwin, Dr. Thomas Sporleder, and Dr. Wayne Purcell for their help in developing the supply model used in this study.

the price of complements, should theoretically be included in any livestock supply model, for the sake of simplicity, this variable was immediately ruled out as a possible explanatory variable to be used in this study because of the foreseen difficulty in determining those products which are complements to meat, which could include virtually all agricultural commodities.

Taking into consideration the remaining five variables, the following general supply model for livestock products[14] was determined:

$$L = (pL;\ pS_1,\ldots,pS_m;\ pX_1,\ldots,pX_m;\ Z_1,\ldots,Z_n;\ T)$$

where, L represents the supply of livestock;

pS_i represents the price of substitutes for L;

pX_i represents the price of the variable inputs;

Z_i represents the quantities of fixed inputs; and

T represents technological change related to the production of livestock.

This general livestock supply function could then be disaggregated and the resulting disaggregated supply function for beef could be specified as:

$$B = (pB, pV, pP, pC, pS, pF_1,\ldots,pF_n, pVit, pVet, pLab, pK, L, T)$$

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[14] The author's original intention was to model the entire livestock sector of Spain with a view to supply shifts resulting from EC accession. However, due to lack of reliable data and time limitations, the author chose to limit the empirical analysis to the estimation of the supply of beef.

where B is the supply of Beef;

pB and pV = the market price that farmers receive for cattle and veal calves;

pP = the market price that farmers receive for hogs;

pC = the market price that farmers receive for chickens;

pS = the market price that farmers receive for sheep and lambs;

$pF_1,\ldots,pF_n$ = the price that farmers pay for feedstuffs used in the production of beef;

pVet = Veterinary costs and medicants;

pVit = the cost of vitamin and trace mineral supplements;

pLab = price of labor--expressed as the farm wage rate;

pK = price of capital to reflect the cost of running a capital-intensive livestock industry;

pL = price of land; and

T= time (used an indicator of technological change).

The general supply function above then had to be further defined in order to reflect a supply function for the domestic supply of beef in Spain, i.e. all the different variables which are relevant to beef production in Spain had to be incorportated into the final estimated supply function.

Specification of a supply function for beef in Spain

was not easy given the heterogeneity of the sector, but in order to accurately estimate the supply of beef and veal in Spain, certain country-specific characteristics had to be included in the model. Table 4.1 gives a list of all the variables used in this study. All of these variables have been selected with two considerations in mind. First, they must be theoretically important and relevant to the determination of the aggregate supply of beef and veal in Spain; and secondly, they must be quantifiable and either available or computable from serial publications. The following section gives a brief justification of each of the variables used in this study, indicating why it is hypothesized to be important in the determination of the aggregate supply of beef and veal in Spain.

Several different models were used in the analysis to see which would theoretically and statistically be the "best" model for predicting the future supply of beef in Spain. All of the models were comprised from variables which were determined to be important to the production of beef in Spain and then those variables which were chosen for each model were transformed in various ways (e.g. the first model incorporates price variables expressed in current pesetas, while in the second model the prices of the variables used were lagged by a predetermined number of years, and the third model used the logorithums of the price variables rather than original variables). The final models

to be estimated are as follows:

(1). A model with all price variables expressed in nominal terms which includes the cost of the individual feedgrains:

Beef1 = (pB, pV, pM, pP, pC, pS, pL, pFC, land, plab, I, T)

(2) A model with the price variables lagged one year and deflated by the GNP delflator (using 1980 as a base-year) to get all prices in real terms.

Beef2 = (pB_{t-2}, pV_{t-1}, pM_{t-1}, pP_{t-1}, pC_{t-1}, pS_{t-1}, pL_{t-1}, $pBar_{t-1}$, $pCorn_{t-1}$, $pSoy_{t-1}$, $pWhBr_{t-1}$, $pAlfa_{t-1}$, land, plab, I, T)

(3) A model which uses the logorithmic values of the variables used in model (2) instead of using the actual variables.

Beef3 = f(logpB_{t-2}, logpV_{t-1}, logpM_{t-1}, logpP_{t-1}, logpC_{t-1}, logpS_{t-1}, logpL_{t-1}, log$pBar_{t-1}$, log$pCorn_{t-1}$, log$pSoy_{t-1}$, log$pWhBr_{t-1}$, log$pAlfa_{t-1}$, logland, logplab, logI, logT)

Table 4.1 A List of Variables Used, Assigned Code and the Expected Signs of the Coefficients

Variable No.	Variable Code	Variable Name	Expected Sign of Coefficients
Y	**BEEF**	Supply of Beef and Veal in Spain (1,000 metric tons)	
X1	**pB**	Current annual market price of beef (Pstas/Kg)	+
X2	**pV**	Current annual market price of Veal (Pstas/Kg)	+
X3	**pM**	Current annual market price of Milk (Pstas/L)	+/-
X4	**pP**	Current annual market price of Pork (Pstas/Kg)	-
X5	**pC**	Current annual market price of Poultry (Pstas/Kg)	-
X6	**pS**	Current annual market price of sheep (Pstas/Kg)	-
X7	**pL**	Current annual market price of lambs (Pstas/Kg)	-
X8	**pFC**	Current annual market price of feed compound (Psta/Kg)	-
X14	plab	Current average wage of farm laborers (Pstas/Hr.)	-
X15	land	Land used for pasture (1,000 ha.)	-
X17	I	Interest rate in the current year (percent per annum)	-
X18	T	Time used as a proxy for technology	+
XX1	pB_{t-2}	Annual market price of beef (lagged two years)	+
XX2	pV_{t-1}	Annual market price of veal (lagged one year)	+

XX3	pM_{t-1}	Annual market price of milk (lagged one year)	+/-
XX4	pP_{t-1}	Annual market price of hogs (lagged one year)	-
XX5	pC_{t-1}	Annual market price of chickens (lagged one year)	-
XX6	pS_{t-1}	Annual market price of sheep (lagged one year)	-
XX7	pL_{t-1}	Annual market price of lambs (lagged one year)	-
XX9	$pBar_{t-1}$	Price of barley (lagged one year)	-
XX10	Soy_{t-1}	Price of soybeans (lagged one year)	-
XX11	$pCorn_{t-1}$	Price of corn (lagged one year)	-
XX12	$pWhBr_{t-1}$	Price of wheat bran (lagged one year)	-
XX13	$pAlfa_{t-1}$	Price of alfalfa hay (lagged one year)	-
XX14	plabor	Price of labor (Pstas/Day) (lagged one year)	+/-
XX17	I_{t-n}	Interest rate (lagged by 1,2,3,4 years in successive regressions)	-

LX1-LX17 ARE THE LOGS OF THE REAL VARIABLES (X1-X17)

LLXX1-LLXX17 ARE THE LOGS OF THE LAGGED VARIABLES

Justification of the Variables Used

The models vary in the incorporation of the different independent variables. Another difference is that the second and third models incorporate deflated price variables rather than price variables which are expressed in current pesetas. The reason for the variables having been deflated is to account for the high inflation rate in Spain--it is assumed that producers respond to real price changes rather than to changes in the nominal value of agricultural products.

Although we assume that it takes time for a producer to respond to price changes, the author chose to use both a model with lagged variables and one without time lags. In addition, a log-linear model was defined because it is common to use such a model when dealing with time-series data. Also, because the number of observations (in this case 18 for the period 1970-87) statistically determine the total number of explanatory variables that can be used in regression analysis, the author had to limit the number of variables used in each model. Thus, there are some variables (e.g. the individual prices of the feeds) that are used in one model and not the other. Some prices are lagged by one or two years in order to allow time for farmers to expand (or contract) their output and use of variable inputs in response to price changes.

In U.S. supply equations for beef, the price of beef is usually lagged six months to a year, but since Spanish beef

and dairy cattle do not reach market weight as quickly as U.S. beef cattle and, consequently, are not slaughtered as young, the price of beef is lagged by 1 and 2 years in successive regressions. Another reason for the smallest lag equaling one year is that the price data used for this variable were only available annually. A two year lag also seemed reasonable to try because approximately 1/4 of all cattle are slaughtered after the they reach two years of age.

As explained in chapter II, beef, veal, and milk production are generally simultaneous enterprises in Spain because of the extensive use of dual-purpose breeds of cattle. Because of this, the price of veal and the price of milk were also included into the supply equation for beef. The price of veal is expected to have a positive coefficient by contributing to the amount of meat available on the market, while the price of milk is expected to have a negative coefficient because higher support prices for milk in the EC scenario is expected to have a negative impact on beef production in Spain. The reason that higher milk prices could decrease production of beef is because Spanish beef producers may have an economic incentive to increase milk production; thus, farmers would restrain from slaughtering their milk cows which would tend to decrease the supply of beef over time. It is also possible that the price of milk could have a positive effect (i.e. a positive

regression coefficient) on beef production as lower support prices for milk and dairy quotas imposed by the EC to try to reduce milk surpluses could cause distress slaughter of cull dairy cattle--thereby shifting the supply curve for beef to the right (i.e. increasing the supply of beef over time). This is more likely to result, but to what extent farmers slaughter their dairy cattle depends on both the price of beef and the price of milk as well as the prices of all the variable inputs.

The prices of competing livestock products (i.e. pork, poultrymeat, lamb and mutton) are expected to have negative coefficients because increases in their prices would negatively affect the supply of beef in Spain. The reason for this is that if the price of pork, for example, is increased relative to the price of beef, a beef producer may opt to decrease his production of beef and begin raising pork (assuming that a Spanish beef producer can easily switch his beef operation to a swine operation using the same basic variable inputs) to increase his gross margin. This may not be so is in the case of poultry because poultry is produced on intensive production systems in Spain, whereas beef is produced on semi-intensive, or extensive systems. Thus, it would not be reasonable to assume that a beef producer could easily switch to producing poultry and still make a profit in the short-run because of the initial capital investments which he would have to make in order to

enter this industry. Other factors, such as the cost of purchasing poultry confinement systems and the cost of corn fed to poultry would probably prevent a beef producer from becoming a poultry producer in response to higher poultry prices. Nevertheless, since it is reasonable to assume that a beef producer may begin to produce sheep, lambs, or swine in response to higher relative prices for these species of livestock, the regression coefficients for all of the above are expected to be negative.

It is reasonable to assume that the prices of feedgrains used in the production of cattle should be lagged by 3 to 6 months since there is also a time lag between a change in the cost of feed and the farmers' reaction to this price change in terms of adjusting production. But since only annual price data were available, the price of all feedgrains are lagged by one year in the second equation. Since feed grain rations vary on the different farms in Spain and since the price data were available through 1987, a variable which combines the cost of cereals fed to cattle (a feed-mix price variable) was incorporated into the first model, whereas the second model accounts for the cost of the individual feed grains. Again, increased feed prices are likely to result in decreased production of beef and veal so their expected coefficients are negative.

Although in the long-run veterinary costs, the cost of medicines, and the cost of vitamin and mineral supplements

represent a substantial variable cost to beef producers and could affect the supply of beef in Spain, price data for these variables were not available so they had to be excluded from the supply models.

The cost of labor (expressed in the models as the wage rate for agricultural workers who work as cattle managers) is included because labor costs represent both an increased variable input cost to beef producers who wish to expand production and an opportunity cost for producers who could be working in some other agricultural activity if they were not raising cattle.

To reflect the cost of capital in a capital-intensive industry, the interest rate (i.e. the private lending rate in Spain for the period 1970-1987) was also included in both of the supply models. The interest rate was lagged by 1,2,3, and 4 years to see which year's interest rate has the greatest effect on the supply of beef.

Finally, a time variable was included in all of the models as an indicator of technological and structural change related to the production of beef in Spain. This variable should have a positive effect on the supply of beef in Spain.

Statistical Procedure: Multiple Regression Analysis

In order to estimate the supply of beef in Spain, determine those explanatory variables which are statistically significant to the supply model, and make forecasts of future supplies, the author used a statistical package called SAS to run a series of regressions of the dependent variable, the supply of beef, against all the independent variables in table 4.1. The procedure is called multiple linear regression analysis.

In multiple regression an attempt is made to predict a single dependent variable from any number of independent variables. In multiple regression analysis the regression equation is defined as the path of the mean of the dependent variable Y (in this case it is the supply of beef) for all combinations of $X_1, X_2, \ldots, X_n$ (the independent variables defined in table 4.1). In other words, for every combination of fixed X's there will be a distribution of Y's. Each distribution will have a mean $\mu_{Y \mid X_1, X_2, \ldots, X_n}$ and standard deviation $\sigma_{Y \cdot X_1, X_2, \ldots, X_n}$. These distributions are assumed to be normal and the standard deviations equal (homoscedasticity). It is assumed that the path of the means of Y takes the form:

$$Y = \text{Á} + \tilde{A}_1X_1 + \tilde{A}_2X_2 + \ldots \tilde{A}_nX_n$$

where Á, $\tilde{A}_1$, $\tilde{A}_2$, . . ., $\tilde{A}_n$ are constants and $X_1, X_2, \ldots, X_n$ are the independent variables. A multivariate normal population is assumed, in which the variate is distributed

normally about all others. A multivariate normal distribution insures that regression equations will be of the above form, that the distribution of Y's for fixed X's will all be normal, and the variances are also equal. The Ã's obtained in multiple linear regression equations are referred to as partial coefficients, since the coefficients involve slopes that would be obtained by holding constant each of the remaining independent variables considered in the regression equation.

The regression equation is fitted to the empirical data; the least squares criterion and the Cp criterion will be used to obtain the "best" fit of the model. The form used shall be:

$$Y = a + b_1X_1 + b_2X_2 + . . . + b_nX_n$$

and it will happen that, provided the true regression equation is actually of this same form, the least squares equation represents the best estimate of the actual regression equation. In other words if a and b_i are used to estimate the true coefficients Á and $Ã_i$, these estimates will be unbiased and the most reliable.

Assumptions of the Model

It is expected that none of the basic assumptions of linear regression analysis will be violated to any significant extent. These assumptions again are:

(4.1) Normality: e_t is normally distributed

(4.2) Zero Mean: $E(e_t) = 0$

(4.3) Homoscedasity (the standard deviations of the errors are equal): $E(e_t^2) = \sigma^2$

(4.4) Nonautoregression: $E(e_t\ e_w) = 0$ where t does not equal w

(4.5) X is of rank $k < n$

The first and second assumptions state that for each value X_i there is a stochastic disturbance, and that this disturbance (represented by e, the error term) is normally distributed with a mean value of zero. The third assumption concerns homoscedasticity and means that every error term has a variance equal to σ^2 whose value is known. Since the magnitude of the error is expected to be the same, both high and low values of the independent explanatory variables X_i are expected to have the same dispersion of error. The fourth assumption concerns non-autoregression, which implies that the error terms are random and when plotted are not expected to form any serial pattern. Assumptions (4.2) and (4.5) together imply that the random error terms are independent in the probability sense. The last assumption deals with multicollinearity of the independent variables. The assumption is that the number of independent observations exceeds the number of parameters to be estimated (therefore at least 17 observations of each variable are needed for this study) and that no exact linear relationship exists between any of the explanatory variables (Neter).

Tests of the Model

Two general types of tests will be applied to the beef supply model. The first type will determine the statistical and theoretical merits of the model and the second type will determine the forecasting accuracy of it. The first type of test is important because before the model can be used to forecast the future supplies of beef in Spain, its theoretical and statistical soundness must be determined. Once the model has "passed" the first type of test, then it must face the "ultimate" test, i.e. its usefulness in estimating the supply of beef in Spain over a specified period of time.

Theoretical and Statistical Tests[15]

Economic theory and knowledge about Spain's beef cattle industry give us a priori expectations abut the signs and magnitudes of the regression parameters to be estimated in the analysis based on an understanding of the relationship between the various variables used in the model. Signs of the regression coefficients will be compared with the expected signs from table 4.1.

Statistical validity and goodness of fit of the regression equation will be tested using standard statistical tests that are part of the SAS package. These include:

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[15] All the material from this section comes from Neter, Applied Linear Regression Models and from consultation with an IRCC statistics consultant.

(1) Standard errors of parameter estimates

(2) The standard deviation of the estimates

(3) The t-test for significance of the regression coefficients

(4) The F-test for evaluating the regression equation

(5) The coefficient of multiple determination, R^2

(6) Mallow's Cp criterion for determination of how well a reduced model predicts the dependent variable, Y

Tests of significance as commonly used are designed to measure whether the observed value differs significantly from zero. This is referred to as the "null hypothesis." In most cases, a test could also be made to decide whether the observed values differ significantly from some other value like the mean. Tests of significance may be made under any of the following conditions: (1) with no previous knowledge; (2) applied to a factor that is believed to be unimportant (in these cases, a non-significant value for a regression or correlation coefficient would indicate that the factor should be eliminated from the analysis); or (3) applied to a factor which for theoretical reasons is believed to be important to the analysis. A non-significant result in this last instance does not indicate that the factor is not important or that it should be

disregarded. It does indicate a need for further evidence to prove beyond reasonable doubt that the factor is important. If tests of significance as applied to correlation measurements are to be valid, the independents or predetermined variables must be known without error and the unexplained residuals must be randomly distributed.

Tests for Forecasting Accuracy

The major objective of this study is to provide predictions of the supply of beef in Spain as the country applies the principles and mechanisms of the CAP. As such it is important to be able to determine how accurate the predictors are so several methods will be used to test the accuracy of the supply forecasts. These include:

(1) Comparing the forecasts with the actual supply of beef in each year analyzed;

(2) Measuring the proportion of times that the model forecasts in the correct direction of the actual quantities of beef supplied during the test period;

(3) Determining the number of times when the forecast supply is within 1,000-2,000 metric tons of the actual supply.

The first test will involve expressing the forecasted supply as a percentage of the actual supply. An arbitrary range of $\pm$ 10 % will be considered acceptable, i.e., the model will have been deemed to satisfactorily predict the supply of

beef if the estimated quantity of beef supplied is within 90 percent and 110 percent of the actual quantity supplied. A one percent or five percent range is usually used in statistical analysis, but a wider range has been chosen because of the nature of the study and the limitations of data, i.e. very high accuracy is not expected.

The second test involves calculating the percentage of correct directional change forecast. This should give an indication as to whether the supply model is directionally reliable (from which trends in beef production may be examined) even if the accuracy of the predictions is marginal. The calculation will be:

$$\% \text{ CDCP} = \frac{\text{the no. of years when the direction of change in beef supply was correctly predicted}}{\text{Total no. of years being forecasted}} \times 100$$

where CDCP = Correct Directional Change Predicted

The final test for forecasting accuracy determines the proportion of times when the predicted supply of beef is within 1,000-2,000 metric tons of beef (an arbitrary range) of the actual supply of beef produced in Spain during the period of the this study.

Chapter V

RESULTS OF THE ANALYSIS AND INTERPRETATION OF THE FINDINGS

This chapter presents the results of the analysis of the data. In the statistical derivation of the estimating equations, an attempt was made to use only the seven or eight most significant variables as explained in chapter IV. The selection of those variables was accomplished by determination of their theoretical importance, by looking at the correlation coefficients among the various variables and by examining the R^2 values and C_p values of the variables selected in the stepwise regression analysis. An attempt was made not to use any two variables in the same model if they had a high correlation with each other since unless the correlation was spurious, they would both tend to explain the same variation in the dependent variable (i.e. the supply of beef). Thus one of the variables would appear to have less statistical significance than it actually has in the real world. The stepwise regression analysis and autoregression technique aided in the selection of the variables used in the final regression equations since at each iteration the SAS program printed various statistical parameters for each variable such as partial F statistics aand the t-statistics, as well as the F-ratio for the entire equation. Any variable which had a significant effect on the t-statistics and partial F statistics of the other

variables was deleted or the variables which it affected were omitted from the next try at deriving the best estimating equation. Thus, by using the stepwise technique, variables were added to the model or taken out of the model until the "best" model was achieved.

Results of the Models

This section presents the estimating equations for the various models which were analyzed. A summary of the results of the various estimation equations is given in Table 5.1, and Table 5.2 gives a comparison of the statisical tests performed on the various models. Unfortunately, in spite of using numerous alternatives, the attempt to statistically estimate a function which would model the supply function for beef in Spain was unsuccessful. For reasons not yet known, the author was unable to obtain a stable model in which the variables all had the expected regression coefficients and were statistically significant. Therefore, since a stable model could not be achieved, no predictions about the future supply of beef in Spain could be made because the forecasts would have been unreliable.

One possible explanation as to why a stable model could not be estimated could be because of the problem of multicollinearity, i.e. all of the variables used in the models were highly correlated as seen in Table 5.3. Another reason could be that there is something inherently wrong

with the data used in the analysis. Yet, another problem stems from the fact that Spain is a net importer of beef and although the author wished to estimate domestic production, it is possible that the price of beef is greatly affected by domestic and trade policy and, therefore, not determined or explained by market forces. In any case, the results of the analysis, which are less favorable than had been expected, are summarized below. For the t-statistics in Table 5.1 and the F-statistics in Table 5.2, a *** indicates the variable (equation) was statistically significant at the 99% confidence level; a ** means that the variable (equation) was significant at the 95% confidence level; and a * indicates significance at the 90% level of confidence.

Table 5.1 A Comparison of the Regression Equations Fitted to the Annual Data for the Period 1970-87.

Variable	Model No.1	Model No. 1S
Intercept	-3975.341 (-3.21)**	-693.452 (-1.11)*
Nominal price of Beef (X1)	-4.926 (-3.67)***	7.736 (1.65)*
Nominal price of Veal (X2)	4.983 (2.84)**	4.391 (1.72)
Nominal price of Lambs (X7)	0.277 (0.61)*	-1.216 (-3.21)*
Nominal price of feed compound (X8)	42.418 (4.23)**	-113.21 (-3.43)*
Current wage of farm laborers (X14)	-0.207 (-0.85)***	1.235 (1.14)*
Land used for pasture (X15)	-0.007 (-0.15)*	0.126 (1.831)*
Interest rate in the current year (X17)	-1.158 (-1.22)*	-2.438 (-0.98)
Time used as a proxy for technology (X18)		57.937 (3.42)*
R^2	.9300	.9556
F-statistic	11.805**	11.744**

For the t-statistics and the F-atistics, a *** indicates the variable (equation) was statistically significant at the 99% confidence level; a ** means that the variable (equation) was significant at the 95% confidence level; and a * indicates significance at the 90% level of confidence.

Model No. 1 uses all prices in current pesetas in a linear combination.

Model No. 1S uses all prices in current pesetas, but the variables which had the opposite sign of the expected sign, namely the price of beef and the price of the feed compound, were squared in this regression model.

Variable	Model No.2	Model No. 2S
Intercept	130.264 (11.24)***	-894.456 (-1.11)
Real Price of Beef (XX1)	13.299 (0.05)	9.736 (1.85)*
Real Price of Barley (XX9)	-667.451 (2.21)*	-734.462 (-3.16)**
Real Price of Soybeans (XX10)	-70.78 (-0.74)*	76.157 (-1.12)
Real Price of Corn (XX11)	-83.98 (-3.93)	-0.481 (-0.04)
Real Wage for Farm Labor (XX14)	-3.769 (-0.94)*	-8.034 (-2.26)**
Land Used For Pasture (X15)		-0.122 (-0.17)*
Real Interest Rate (XX17)		-13.687 (-2.06)*
Time (X18)		51.907 (3.76)**
R^2	.5015	.6932
F-statistic	1.845*	2.947

For the t-statistics and the F-statistics, a *** indicates the variable (equation) was statistically significant at the 99% confidence level; a ** means that the variable (equation) was significant at the 95% confidence level; and a * indicates significance at the 90% level of confidence.

Model No. 2 uses real price variables which were deflated using the GNP deflator(see Appendix A)

Model No. 2S uses real price variables which were deflated using the GNP deflator, but those variables which were not statistically significant at the 90% confidence level in the first model (denoted by an asterick) were squared in this regression model.

Variable	Model No.3	Model No. 4
Intercept	420.611 (10.19)***	76.925 (1.30)
Lagged real price of beef(LX1)	91.454 (0.86)	101.732 (0.76)
Lagged real price of veal (LX2)	69.447 (0.98)	
Lagged real price of milk (LX3)	-338.851 (-1.08)	
Lagged real price of barley (LX9)	-107.452 (-0.14)	-163.799 (-0.42)
Lagged real price of soybeans (LX10)	-70.518 (-0.47)	-42.925 (-0.338)
Lagged real price of corn (LX11)	-76.755 (-1.63)	-229.008 (-0.773)
Lagged real price of wheat bran (LX12)	43.998 (0.73)	
Lagged real price of alfalfa (LX13)	52.737 (1.09)	-71.002 (-0.242)
Lagged real wage rate (LX14)	-6.039 (0.96)*	-1.242 (-1.035)
Two year lagged interest rate (LX17)	-41.963 (-1.24)*	-53.057 (-0.987)*
R^2	.4059	.3969
F-statistic	0.759	0.268

For the t-statistics and the F-statistics, a *** indicates the variable (equation) was statistically significant at the 99% confidence level; a ** means that the variable (equation) was significant at the 95% confidence level; and a * indicates significance at the 90% level of confidence.

Both Models No. 3 and No. 4 are variations of the original lagged model (No. 2) as defined in the previous chapter. They are presented here for comparison purposes only; only the interest rate proved to be statistically significant at the 90% confidence level in these two estimation equations.

Variable	Model No.5
Intercept	-938.32 (-1.27)
Log of lagged real price of beef (LLX1)	54.275 (0.31)
Log of lagged real price of veal (LLX2)	348.342 (1.47)
Log of lagged real price of milk (LLX3)	-622.156 (-1.78)
Log of lagged real price of barley (LLX9)	-65.566 (-0.35)*
Log of lagged real price of soybeans (LLX10)	-71.896 (-0.74)
Log of lagged real price of corn (LLX11)	-13.837 (-0.78)
Log of lagged real price of wheat bran (LLX12)	113.332 (-1.19)
Log of lagged real price of alfalfa (LLX13)	-139.592 (-0.88)
Log of real wage rate (LLX14)	-81.721 (-1.05)
Log of real interest rate (LLX17)	-41.358 (-2.43)
Log of T (LLX18)	113.548 (1.98)*
R^2	.6073
F-statistic	1.031

Model No. 5 takes the logs of the various real lagged variables and fits them to a linear regression model

Table 5.2 A Comparison of the Models--The Statistical Tests

	R^2[1]	Cp[2]	F-ratio[3]	S.D.[4]
(1) (7 variables)	.9300	12.34	11.805**	16.034
(1S) (8 variables)	.9556	15.65	11.744**	15.652
(2) (5 variables)	.5015	12.91	1.845*	26.758
(2S) (8 variables)	.6932	23.91	2.947	32.871
(3) (10 variables)	.4059	41.72	0.759	42.884
(4) (7 variables)	.3969	20.86	0.268	39.417
(5) (11 variables)	.6073	23.41	1.031	34.619

[1] A good model should have a high R^2, i.e. close to 1.00

[2] A good model should have a low Cp constant

[3] A good model should be have a significant F-test, denoted by *

[4] A good model should have a low standard deviation (s.d.)

As stated in Chapter IV, there was an a priori expectation of the signs of the regression coefficients based on economic theory and knowledge of Spain's beef cattle industry. However, as one can see from Table 5.1, the signs of the regression coefficients for the independent variables were not stable. When transformations were made, the signs of the coefficients often changed; thus, it is difficult to interpret the signs of the coefficients.

Table 5.4 gives the Pearson correlation coefficients of the independent variables, and as one can see there is a severe case of multicollinearity in the data used in the analysis. This problem could be the cause of the instability of the signs of the

regression coefficients, but a lack of time and lack of knowledge, prevented the author from making the necessary adjustments of the empirical data set in order to compensate for the high correlation between the variables.

Table 5.4. Correlation coefficients of the predictor variables.

	X1	X2	X3	X7	X8	X9
X1	1.000	.9947	.9764	.7982	.6453	.9336
X2		1.000	.9877	.8050	.4723	.9488
X3			1.000	.8003	.6357	.9739
X7				1.000	.6584	.6753
X8					1.000	.5487
X9	.9336	.9488	.9739	.6753	.5487	1.000
X10	.9382	.9613	.9726	.8107	.5987	.9383
X11	.9201	.9391	.9725	.6929	.6843	.9563
X12	.9376	.9499	.9741	.6812	.6453	.9959
X13	.8240	.8309	.8393	.8996	.7123	.7178
X14	.9423	.9604	.9878	.8222	.7934	.9688
X15	-.9423	-.9331	-.9454	-.8034	-.8127	-.9007
X17	.3378	.3719	.3715	.5491	.5987	.2828
X18	.9429	.9592	.9863	.8360	.8713	.9514

	X10	X11	X12	X13	X14	X15
X10	1.000	.9563	.9462	.8153	.9742	-.9176
X11		1.000	.9909	.7328	.9781	-.8935
X12			1.000	.7263	.9710	-.9055
X13				1.000	.8268	-.8923
X14					1.000	-.9286
X15						1.000
X17	.3767	.2801	.2331	.4669	.3768	-.2904
X18	.9655	.9633	.9542	.8767	.9918	-.9526

Chapter VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

Spain's recent entry into the EC will cause significant challenges for the entire livestock sector, but especially for the beef and veal sector because of this sector's general low level of development. It is the country's beef producers who are expected to have the most difficulty in adjusting to membership and this sector is the one in which the most change is expected.

This study has primarily looked at the livestock sector of Spain prior to membership in the EC in an attempt to determine the effect that entry into such an international organization will have on the Spanish beef sector, and ultimately on the supply of beef in Spain. The supply of beef is expected to decrease after the country adopts the full mechanisms of the CAP because of the expected changes in the prices of feedgrains fed to beef cattle and the expected decreases in the real price that farmers receive for beef and veal relative to the increases in input costs. Unfortunately, since Spain is still in the transition period and will not adopt the full market and pricing mechanisms of the CAP until 1993, the actual extent of these price changes is yet unknown and the extent to which farmers will be adversely affected by the relative price changes is, likewise, unknown. This fact makes this study both timely and relevant.

This study had five major objectives: the first one

was to examine the process of EC enlargement and discuss the implications of this enlargement with regard to the Community's agricultural policies. The second and third objectives were to assess the situation of Spain's agricultural sector prior to accession and discuss the nature of the likely changes that will occur within Spain's beef sector because of EC membership. These three objectives were accomplished by reviewing pertainent literature and summarizing the findings in the first three chapters. These chapters provided the background for the more specific objective of analyzing the product and input price changes that would likely result from adherence to EC policies (the fourth objective). This then led to the final objective, i.e. to determine the impact of these price changes on the domestic supply of beef and then statistically estimate the relationship between these variables and supply. In order to accomplish the last two objectives, first, time-series data were collected from various secondary sources (see Appendix B) for the period 1970-1987. Then the data were tabulated and adjusted to make sure that all the data were consistent (e.g. all the prices were expressed in nominal terms, in pesetas, etc.). Finally, a series of linear regression models for the supply of beef was developed and the data were fitted to these models. From the models, it was hoped that predictions could be made concerning the supply of beef in Spain.

However, conclusions about the future supply of beef in Spain cannot be drawn from this study because the results of the

empirical analysis are not conclusive. The analysis failed to produce a stable model from which conclusions could be drawn or forecasts of beef supply could be made. Since the analysis of the data did not result in a stable, reliable supply model, no predictions were made. Had a stable supply model been estimated, predictions for the future supply of beef (at some point in time after 1993 when the CAP becomes fully effective in Spain) would have been made and conclusions about the impact of the CAP on domestic supply could have been drawn from these estimates. However, since the results of this study are not reliable, the author will refer to the work of others who carried out similar studies (Peterson et. al., Briz, Agra-Europe, 1980) in order to make general conclusions about the impact of the CAP on the Spanish beef sector.

General Conclusions

Spain's entry into the EC and the expected increases in production costs associated with higher feedgrain costs in the EC scenario could cause decreases in the future supply of beef in Spain. Therefore, beef producers may have an economic incentive to reduce the use of feedgrains in favor of forage or they should be encouraged to change their production structures in order to gain economies of scale. The authors of the Agra-Europe report believe that accession will harm the Spanish beef producers even if intervention prices for beef are increased. They suggest that the generally low level of development of this sector will keep it from competing with other beef producers in the Community.

They also predict continued deficits in beef supply that will likely be balanced by increased imports from France and the Netherlands to replace the current imports from Latin America. Peterson's study suggests that not only the small producer will be affected, but the increased feed costs and lower beef prices in the EC will considerably reduce the net margins realized from the more intensive cattle-fattening operations, too. Thus, it seems that the entire beef sector is likely to be adversely affected by membership in the EC.

Policy Recommendations

The Spanish Government will be faced with a number of policy issues and are now being faced with the challenge of finding acceptable "solutions" to all of the problems that the adoption of the CAP will cause for Spanish farmers. Since substantial deficits are projected for beef and corn at the same time that barley surpluses are projected to continue increasing, the most logical thing for policy makers to do is to encourage domestic barley use at the expense of imported corn. Another option, and the most likely alternative, is for policy makers to subsidize the modernization of the beef cattle industry and help producers to make their production systems more efficient. Policy makers will also probably want to encourage early retirement for producers and inititate programs to teach producers skills that can be used for off-farm work. Of course, these policy measures cannot be enacted overnight, but over the long-run they could help ease the negative impacts of accession.

In the short-run, however, the Government may find it best to institute policy reforms designed to support producers' incomes (e.g. direct income transfers) in order to offset any reduction in the supply of beef associated with increases in feed costs.

It cannot be predicted what measures the Spanish government will take to help beef producers make the transition into the EC, but even if short-term solutions are found, the ultimate challenge still faces the producers to make a concerted effort to adapt to the new situations in which they now find themselves.

Suggestions for Further Research

Since the results of this study are inconclusive and the author was unable to make any predictions about the future supply of beef in Spain, it is suggested that a similar study be conducted using the same data set or perhaps an expanded data set, but using models which are adjusted so that the problem of multicollinearity of the predictor variables is diminished. If a stable model can be achieved, then the researcher should make forecasts of the future supply of beef and compare these forecasts with the historic trend of beef production in Spain prior to the country's entry into the Community.

Furthermore, since Spain is still in the transition period and will not have adopted the full market and pricing mechanisms of the CAP until 1993, a study could be conducted which examines the effect of future CAP reforms (which are now being debated) on the beef sector, on a different sub-sector of

the livestock sector, or on a different sub-sector of the agricultural sector (e.g. the horticultural sector).

This study should be certainly be followed by one which examines how Spain adapts to the CAP after the CAP has been in operation for a number of years, and since the CAP is such a controversial issue both inside of the EC and out, it is particularly important to continue to study the effect that the CAP will have on EC member states and on third-country producers. Further study of the CAP and how it may affect potential new members of the Community should certainly be considered (Turkey has recently applied for admission) for other applicant countries may face the same problems that Spain faced at the time of accession.

By design, all EC member states should enjoy the same benefits and privileges under the CAP. However, if reforms do not come soon, a form of modified membership, implying a two-tier Community, could be forced on the EC, not by political design, but by the inability of the existing institution to react to the demands of enlargement.

APPENDICES

APPENDIX A

Spanish Peseta Exchange Rates,

Relative to the U. S. Dollar and ECU

PESETA EXCHANGE RATES

Year	Peseta/Dollar	Peseta/ECU
1965	59.88	64.06
1966	59.88	64.07
1967	69.57	74.08
1968	69.69	71.70
1969	69.93	71.48
1970	69.59	71.13
1971	65.90	69.05
1972	63.45	71.18
1973	56.85	70.02
1974	56.11	66.92
1975	56.77	74.16
1976	68.29	76.36
1977	80.91	92.33
1978	70.11	89.34
1979	66.15	90.67
1980	79.25	110.34
1981	97.45	108.80
1982	125.60	123.05
1983	156.70	139.49
1984	173.40	136.81
1985	148.00	138.92

Source: International Financial Statistics

Spanish consumer price index	GNP Deflator
1961 = 31.1	1970 = 33.78
1961 = 31.6	1971 = 34.13
1962 = 33.6	1972 = 34.49
1963 = 36.5	1973 = 34.86
1964 = 39.1	1974 = 35.22
1965 = 44.2	1975 = 35.60
1966 = 46.9	1976 = 35.97
1967 = 49.9	1977 = 36.35
1968 = 52.4	1978 = 36.67
1969 = 53.5	1979 = 36.99
1970 = 56.6	1980 = 1.00 (base year)
1971 = 61.2	1981 = 37.76
1972 = 66.3	1982 = 37.98
1973 = 73.9	1983 = 38.17
1974 = 85.6	1984 = 38.34
1975 = 100.0	1985 = 38.50
1976 = 115.1	1986 = 38.67
1977 = 143.3	1987 = 38.83
1978 = 171.7	
1979 = 198.5	
1980 = 229.5	
1981 = 254.6	
1982 = 263.7	
1983 = 281.2	

Source: International Financial Statistics

Appendix B

Data for the Variables Used in the Analysis and their sources.

Year	Price of Beef	Price of Veal	Price of Pork	Price of Broilers
1970	32.26	525.26	38.76	38.83
1971	34.38	52.56	42.55	41.80
1972	40.13	63.91	51.25	42.82
1973	40.76	67.59	49.64	44.83
1974	46.36	79.22	52.16	51.20
1975	48.59	84.11	67.33	50.43
1976	57.47	104.77	73.95	46.62
1977	59.75	112.56	78.85	59.47
1978	73.81	136.69	89.11	68.94
1979	77.77	156.33	95.98	81.31
1980	75.79	151.04	92.66	79.47
1981	86.45	177.14	104.21	88.09
1982	101.49	210.29	130.08	103.73

(All Data expressed in Pstas/Kg, nominal rates)
Source: Tawil et. al., p. 96

1983	103.94	213.22	136.27	117.08
1984	130.38	281.87	146.32	137.74
1985	139.48	304.89	165.15	136.78
1986	156.95	303.07	182.19	132.05
1987	149.85	313.87	158.78	123.19

(All Data expressed in Psta/Kg, originally in real dollars but changed to nominal values by using the Consumer Price Index)
Source: U.N. "The Livestock and Meat Market," Agricultural Review for Europe, various issues.

Year	Price of Milk	Price of Lambs	Price of Sheep
1970	7.24	62.45	44.92
1971	8.03	67.85	51.05
1972	9.10	83.30	61.31
1973	9.14	94.27	64.71
1974	10.47	104.12	79.61
1975	12.76	121.44	92.27
1976	14.47	143.50	100.39
1977	16.16	178.11	115.18
1978	17.67	226.25	141.93
1979	19.41	276.70	166.09
1980	21.12	292.26	172.01
1981	23.14	314.05	192.83
1982	25.11	341.37	201.44

(All Data is expressed in Pstas/Kg except for the price of milk, which is
expressed in Pstas/L, nominal rates).
Source: Tawil et. al., p. 95-96.

Year	Price of Milk	Price of Lambs	Price of Sheep
1983	26.67	378.24	214.18
1984	32.85	251.43	70.79
1985	34.20	295.42	80.98
1986	35.96	300.33	87.81
1987	38.48	285.01	85.32

(All Data is expressed in Pstas/Kg except for the price of milk, which is expressed in Pstas/L, nominal rates which were converted from real prices
using the Consumer Price Index.)
Source: U.N. "The Livestock and Meat Market," Agricultural Review for Europe, various issues.

Year	Price of Barley	Price of Corn	Price of Soybeans
1970	6.35	6.28	8.41
1971	6.89	6.39	10.24
1972	6.95	7.94	9.35
1973	7.24	8.21	11.70
1974	7.98	9.21	14.92
1975	8.24	9.94	15.20
1976	8.58	11.80	17.47
1977	10.58	15.64	24.72
1978	10.59	15.10	19.38
1979	11.74	16.19	20.61
1980	14.21	17.39	28.26
1981	16.72	21.32	33.44
1982	18.14	24.81	37.23
1983	19.57	31.33	48.53
1984	27.07	36.66	50.24
1985	32.47	37.04	53.03
1986	33.67	34.34	44.59
1987	37.14	46.60	50.54

(All variables expressed in Pstas/Kg in nominal prices)
Sources: Eurostat and the Ministry of Agriculture, 1984.

Year	Price of WhBran	pAlfalfa
1970	4.98	82.00
1971	4.91	86.00
1972	5.39	89.00
1973	5.19	89.00
1974	5.74	129.00
1975	7.49	163.00
1976	8.15	160.00
1977	8.51	170.00
1978	9.12	178.00
1979	10.18	185.00
1980	11.28	192.00
1981	13.04	192.00
1982	14.49	194.00
1983	16.10	195.00
1984	19.57	199.00
1985*	23.90	202.00
1986*	29.44	202.00
1987*	31.90	204.00

(All data is expressed in Pstas/Kg, nominal rates).
Sources: Tawil et. al., p. 94; Ministry of Agriculture 1984 (The last prices, 1985, 1986, and 1987 are linear extrapolations since no data w available for these two years).

Year	Wage [1]	Interest Rate [2]	Population[3]
1970	185	12.98	33615
1971	206	13.21	33959
1972	257	13.24	34288
1973	283	13.61	34609
1974	372	14.51	34932
1975	434	12.24	35263
1976	552	12.71	35610
1977	696	13.24	36148
1978	828	14.96	36505
1979	976	15.77	37199
1980	1132	16.85	37535
1981	1296	15.36	37860
1982	1410	14.98	38182
1983	1620	15.00	38232
1984	1644	16.58	38532
1985	1832	13.52	38542
1986	1945	12.19	38780
1987	1989	16,36	39020

[1]The data used for this variable comes from Tawil et. al., p. 140 and is the average annual wage rates for agricultural workers who are employed as cattle and hog managers for the period 1970-82. The figures for the period 1983-1986 come from Eurostat. The wage rate is expressed in pesetas/day and is in nominal values rather than deflated values.

[2] The data for the interest rate comes from International Financial Statistics and is the interest rate which is available to the privat sector, i.e. the lending rate in Spain. The rate is expressed as a percentage per annum.

[3] The figures for the population come from FAO Production Yearbook.

Year	Land[1]	Exports[2]	Imports
1970	11600	0.2	98.8
1971	11500	0.2	34.2
1972	11400	0.4	78.4
1973	11300	0.6	75.7
1974	11210	0.3	14.0
1975	11088	0.1	26.8
1976	10857	0.8	44.2
1977	10750	0.3	50.2
1978	10900	0.4	73.1
1979	10827	0.5	79.9
1980	10739	3.0	17.0
1981	10718	12.6	18.6
1982	10704	1.0	21.8
1983	10671	1.0	22.4
1984	10640	8.0	20.8
1985	10000	12.3	22.8
1986	10300	0.2	29.7
1987	10220	2.1	35.6

[1] The data for the acreage variable comes from FAO Production Yearbook and is the number of hectares of land used for pasture in Spain.

[2] The trade data comes from the U.N. publications on the livestock and meat market, FAO Agricultural Review for Europe, and from the FAO Trade Yearbook. Both imports and exports are expressed in thousands of metric tons of beef either imported or exported.

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